Annual Report

of the

Department of Agriculture in the Bombay Presidency

For the Year 1931-32

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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PRESIDENCY, 1931-32

CHAPTER I.

FEATURES OF THE YEAR.

The general impression of 1931-32 is that it was a fairly good agricultural year, though definitely inferior to 1930-31. Actual figures, however, indicate that 1931-32 was nearly as good as 1930-31, and the impression mentioned above may be due to the mark left on the mind by three or four outstanding phenomena, such as the exceptionally bad cotton seasons experienced in Khandesh and the adverse conditions which affected the rabi-jowar crop of the east Deccan, the harmful winds which damaged the cotton crop in Dharwar District, and the wheat rust epidemic in the Karnatak. The following tabular statement compares the actual acreage sown and the estimated tonnage of food-grain crops (cereals and pulses) produced in the years 1930-31 and 1931-32 :—

Division.	Area in thousands of acres.		Estimated outturn in thousands of tons.	
	1930-31.	1931-32.	1930-31.	1931-32.
	Acres.	Acres.	Tons.	Tons.
Gujarat	2,545	2,663	641	832
Deccan	11,316	11,129	2,173	2,007
Karnatak	5,034	4,668	914	899
Konkan	1,607	1,598	682	661
Total, Bombay Presidency ..	20,502	20,058	4,410	4,399

When the great slump in prices set in about May 1930, many people jumped to the conclusion that there would be profound changes in the areas sown with different crops, and they argued that crops like cotton were being produced at a loss. The figures of total cropped-area for 1930-31 and 1931-32 do not reveal any very marked departure from the position prevailin

just before the slump, e.g. the year 1929-30, as will be gathered from the following tabular statement :—

Year.	Area in thousands of acres sown with different crops in the Bombay Presidency proper.			
	Food-grain crops (cereals and pulses).	Cotton.	Groundnuts.	All Crops.
1929-30	19,048	4,484	1,068	28,718
1930-31	20,502	3,550	999	29,133
1931-32	20,059	4,065	989	29,372

The following table summarizes the prices prevailing, at harvest time, for agricultural produce in the last three years :—

Prices in seers of 80 tolas per rupee, except of cotton which are recorded in rupees per khandi of 784 lbs.

Year.	Food Crops.				Export Crops.	
	Jowar (Sholapur).	Bajri (Nasik).	Rice (Thana).	Wheat (Ahmedabad).	Broach Cotton (Bombay).	Groundnuts (Karad).
					Rs.	Seers.
1929-30 ..	10	7	6	7	257	8
1930-31 ..	22	9	8	12	197	17
1931-32 ..	23	16	9	12	194	15

The data given in these two tables taken together, seem to indicate that the level of prices does not appreciably influence the total cropped area in the Bombay Presidency. This is not surprising, because where there are men, cattle, land and rain it is economically sounder to grow something than nothing. It is clear, however, that the slump in prices did react on the areas sown with money crops like cotton. The area sown with this crop diminished by over 20 per cent. in the year 1930-31 immediately succeeding the slump which occurred about May 1930. About half the lost ground was again recovered in 1931-32 when the cotton area rose to over 4 million acres in the British districts of the Bombay Presidency proper. The

groundnut area also fell but to a less extent, notwithstanding the fact that the price fell relatively more than that of cotton. In view of the consideration that more cash expenditure has to be incurred on money crops like cotton and groundnuts than on food crops it is natural that the area of the former should shrink relatively to the area of the latter even when the price-slump is general for all produce. It is, however, important to recognize that, apart from a few operations involving cash expenditure, cost of production plays a comparatively minor part in the mind of a peasant farmer in determining what crops to grow on unirrigated land. This is well illustrated by the case of groundnuts. The price obtained for the 1930-31 crop was 17 seers per rupee at Karad, but the Presidency acreage sown with this crop in the succeeding year (1931-32) was about the same as that of the previous year. In 1929 it was thought that double this price would not be sufficient to induce the cultivator to grow groundnuts.

An interesting point pertaining to the price level of Indian agricultural produce generally and cotton in particular, in the year under report, was the repercussion of Great Britain abandoning the gold standard, and its sequel the readjustment of the sterling-dollar cross-rate. This happened in the latter part of September 1931. Previous to the critical date of the 21st September 1931 the price of (Broach) cotton in Bombay had been falling steadily from Rs. 205 at the end of June 1931 to Rs. 145 about the middle of September 1931. Subsequently to this date the price of cotton in Bombay rose steadily from Rs. 145 to Rs. 235 at the end of February 1932. The price of cotton in Bombay varied broadly inversely with the sterling-dollar cross-rate after the gold standard was abandoned, which indicates that the rise in the cotton price during this period was mainly the result of currency depreciation.

The year has been notable for the attention given to the problem of protecting India's raw and manufactured products from foreign competition. The Sugar Industries (Protection) Act, 1932, received the assent of the Governor-General on the 8th April 1932. This Act makes provision for the protection of Indian-produced sugar for a period of 15 years ending on the 31st March 1946; and large numbers of new factories are springing up in the north of India, while the Bombay Deccan is also endeavouring to secure a place in this agricultural industry. This is a matter of much significance because at present the Deccan Canals are a heavy burden on the tax-payer.

The Indian Cotton Mills have successfully achieved their object of securing protection against Japanese competition

(other than dumping), through the passing of orders by the Government of India raising the duty of all non-British imported cotton goods from 25 to 50 per cent. *ad valorem* from 31st August 1932. Unfortunately the Indian Mills have been importing a huge quantity of foreign raw cotton; four lakhs of bales were imported into Bombay during 1931-32 while, it is understood, that about two lakhs of bales were imported through Bhavnagar, making six lakhs of bales in all. An import duty of 6 pies per pound (about Rs. 25 per candy) was imposed upon raw-cotton in September 1931 by the Government of India Finance Act, but it is clear from these import figures that this duty is giving no protection to the Indian cotton-grower. Hence the question of raising this duty is receiving serious consideration. It seems certain that much of this foreign cotton is displacing Indian-grown cotton in the Indian Mills; and this is perhaps the explanation of the fact that there were some 50,000 bales of cotton still unsold in mid-June 1932 in the Surat area, as shown in the following tabular statement :—

Number of F. P. Bales produced, sold and remained to be sold in different centres in South Gujarat (South of the Nerbudda) in mid-June 1932.

Name of centre.		Number of bales.		
		Produced in 1931-32.	Sold.	Balance unsold (approximate).
1		2	3	4
Rajpipla		30,702	29,302	1,400
Anklesvar-Hansot		17,999	16,799	1,200
Kim, Sayan and Kosamba		22,500	13,500	9,000
Surat—				
Kapadia Press	8,400			
N. R. & Co.	4,200			
Sorabjee Press	5,285			
		17,885	8,885	9,000
Bardoli Line—				
Bardoli	13,469			
Chalthan	5,200			
Nawapur	3,500			
Madhi	6,069			
		28,238	10,238	18,000
Navsari-Maroli	....	30,000	19,500	10,500
		147,324	98,224	49,100

A recent event of some significance to Indian agriculture is the establishment (September 1932) of the Section of Agricultural Meteorology by the Meteorological Department of the Government of India, with the aid of a three-year grant from the Imperial Council of Agricultural Research. The character of the research work to be undertaken is indicated in the following extract from a communication from the Director-General of Observatories :—

> "On the 'Research' side, the programme is to investigate the best methods, and standardise them, for the measurement of radiation, evaporation, soil-temperature and soil-humidity, so that these data may, ultimately, be systematically maintained in addition to those of air temperature and air humidity, rainfall, wind, sunshine etc. Some of the other problems in which the new Section may be interested are questions like effective rainfall, the meteorology of the air layers near the ground and the flow of heat and water through the ground surface."

In addition to this research pertaining to technical problems, an important item in the programme will be statistical research. As an example of this latter activity it may be pointed out that the total rainfall is not a reliable guide to the character of the season. It is the effective rainfall which matters. An effort will be made to define the limits within which the seasonal rainfall should lie to ensure a normal crop.

CHAPTER II.

SERVICES RENDERED TO THE PUBLIC.

SEED-SUPPLY OF NEW AND IMPROVED VARIETIES OF CROPS.

The organization of the seed-supply of new and improved varieties of crops is one of the major services which the Department is rendering to agriculture. In this way a large volume of seed of the staple crops, such as cotton and rice, is made available to the cultivator.

Cotton.—In the Karnatak the improved strain of cotton which is being introduced into the Kumpta cotton tract is called "Jayawant". This cotton is superior to the deshi Kumpta in field-yield, ginning-yield, spinning performance and resistance to wilt-disease. In the year under report, in an experiment conducted on the Dharwar Farm the field-yield was 815 lbs. of seed-cotton and the ginning-yield was 27 per cent.; the spinning trial at the Indian Central Cotton Committee's Technological Laboratory showed that this cotton was suitable for 38's warp; the incidence of wilt disease was 1·2 per cent. as against 12·5 per cent. in the case of deshi Kumpta. This cotton is later than deshi Kumpta in maturing by about a week. The supply of this seed is organized in a series of stages as indicated in the tabular statement below for the Hubli Zone :—

Hubli Jayawant Cotton-Seed Scheme.

Stage.	Operation.	According to the scheme when fully developed.		Actual in the year under report, 1931-32.	
		Area sown in	Quantity of seed produced in	Area sown in	Quantity of seed produced in
1	2	3	4	5	6
		Acres.	lbs.	Acres.	lbs.
I	Selfing	A small plot.	120	1	200
II	Multiplication on Dharwar Farm	30	8,000	30	15,027
III	Multiplication on Inner Reserved Area.	800	150,000	1,079	145,408
IV	Multiplication on Outer Reserved Area.	15,000	2,000,000	16,561	801,080
V	General cultivation in countryside.	200,000	..	..	..

This cotton (Jayawant) is also being distributed in the Bailhongal, Athani and Haveri Zones, but on a smaller scale. The total area sown from controlled seed in these three zones

in the year under report was 7,987 acres. Stages III, IV and V of the Hubli Scheme are managed, with the aid of this Department, by the Hubli Co-operative Cotton-Sale Society, and the reason why the actual operations fell short of the project was because the Hubli Society did not purchase all the available good seed produced in the reserved areas owing to practical difficulties which are under consideration. Some seed from good lots of the general area had, therefore, to be purchased to supplement the seed, from the reserved area during the year. The Indian Central Cotton Committee have given valuable support to this scheme by granting a subsidy to cover special expenditure incurred in connection with purifying the fields and handling and transporting the seed to distant depots, when the latter is unrecoverable.

The Karnatak also includes a Dharwar-American cotton tract, and in this tract the Department has introduced an improved strain called Gadag No. 1. This cotton was found superior to the deshi Dharwar-American in field-yield, ginning-yield, and spinning capacity, as explained on page 16 of the 1930-31 report. In the year under report the spinning report of the Indian Central Cotton Committee's technological laboratory showed this cotton to be suitable for 30's warp.

The following tabular statement shows how the supply of the seed of this cotton is organized :—

Gadag Cotton-Seed Scheme.

Stage.	Operation.	According to the scheme when fully developed.		Actual in the year under report, 1931-32.	
		Area sown in	Quantity of seed produced in	Area sown in	Quantity of seed produced in
1	2	3	4	5	6
		Acres.	lbs.	Acres.	lbs.
I	Selfing	A small plot of two acres.	200	4	303
II	Multiplication on Seed Farm at Gadag.	20	2,000	23	4,237
III	Multiplication on Inner Reserved Area.	200	20,000	92	10,400
IV	Multiplication on Outer Reserved Area.	2,000	200,000	1,997	100,000
V	Multiplication on Extension Area.	20,000	2,000,000	20,424	966,300
*VI	General cultivation in countryside.	200,000	..	..	..

*From the general cultivation in countryside 100,000 lbs. of seed was purchased.

Stages III to VI inclusive are managed, with the aid of this Department, by the Gadag Co-operative Cotton-Sale Society, and the reason why the actual operations fell short of the project was because the Gadag Society did not purchase all the available good seed produced in the reserved areas owing to practical difficulties which are under consideration. The Indian Central Cotton Committee are assisting this scheme in the same way as they are assisting the Hubli Scheme.

In Khandesh a similar seed scheme was launched in May 1931 for the distribution of Banilla cotton. This is financed by the Indian Central Cotton Committee. Banilla cotton is a hybrid, bred at Dhulia, having for its parents Bani and Commilla cottons. The principal characters of this cotton were summarized on page 18 of the 1930-31 report, but owing to conflicting results, as regards field-performance, comparative trials are being continued. As the year, under report, was an exceptionally bad year for cotton in Khandesh the results obtained in this season were not considered reliable, and arrangements have been made for further work. In the year under report Banilla cotton grown in the "reserved areas" fetched a premium of Rs. 12 to 27 per candy of 784 lbs. over the price obtained for local deshi cotton and a premium of Rs. 12 to 39 over the rates quoted for Oomra cotton. The price obtainable locally for pure Banilla seed-cotton was Rs. 20 to 22 per maund of 164 lbs. when the rate for local seed-cotton was Rs. 17 to Rs. 18. The ginning percentage of pure Banilla seed-cotton was 40 in the year under report against 34 in the case of local seed-cotton. Samples of lint, from several centres, were sent to the technological laboratory of the Indian Central Cotton Committee, and the report shows that the spinning value in the year under report is 13's as against 8's to 10's in the case of "N.R." cotton. The length of the fibre, however, was $\frac{7}{8}$ths of an inch and reached $\frac{18}{16}$ths in the case of the Patonda sample. It is interesting to note that the sample sent from the breeding plot at Dhulia Farm had a spinning value of 21's and a length of $\frac{7}{8}$ths of an inch.

The following tabular statement shows how the supply of the seed of this cotton is organized :—

Khandesh Banilla Cotton-Seed Scheme.

Stage.	Operation.	Site.	According to the scheme when fully developed.		Actual in the year under report 1931-32.	
			Area sown in acres.	Quantity of seed produced in lbs.	Area sown in acres.	Quantity of seed produced in lbs.
1	2	3	4	5	6	7
I	Selfing	Dhulia Experimental Farm.	5	500	5	465
II	Multiplication on Seed-Farm.	Bhadgaon Seed Farm.	100	30,000	93	8,386
III	Multiplication on Inner Reserved Area.	Bharwas and other villages.	1,000	240,000	871	37,000
IV	Multiplication on Outer Reserved Area.	At five or more centres.	10,000	2,400,000	2,283	90,000
V	Multiplication on Extension Area.	At five or more centres.	100,000	24,000,000	Not yet	reached.
VI	General Cultivation ..	Country side ..	1,000,000	....	....	....

From the statement above it will be seen that this scheme has not been in existence long enough to reach full development, while in the year under report operations were greatly restricted owing to the disastrous season for cotton which resulted in a cotton-crop failure over considerable areas.

In Gujarat the cotton-seed-supply operations in Surat District were continued on the lines described in previous reports.

The operations of the year under report are summarized in the following tabular statement :—

Surat Cotton-seed Scheme.

1027 A.L.F.

Stage.	Operation.	Site.	Actual (in accordance with the full scheme) during the year 1931-32.	
			Area sown in acres.	Seed produced in lbs.
1	2	3	4	5
I	Selfing ..	Surat Experimental Station.	Small Area	156
II	Multiplication on Seed Farm.	A—Surat Farm ..	7	1,965
		B—Surat Farm ..	43	23,746

Stage.	Operation.	Site.	Actual (in accordance with the full scheme) during the year 1931-32.	
			Area sown in acres.	Seed produced in lbs.
1	2	3	4	5
III	Multiplication on Inner Reserved Area.	A—Athwa, Majura, Bhatar, Althan and Umra villages.	625	154,185
		B—Bhuthad village ..	268	58,938
		C—Nizar village ..	563	78,660
			1,456	291,783
IV	Multiplication on Outer Reserved Area.	A—Bharthana, Dindoli, Abhwa, Khambhasla, Navagam, Piplod, Bhimrad and Sania villages.	2,249	504,735
		B—Eru, Vijalpore, Chhapra, Ethan, Pera, Chhinam, Sadlav, Toli, Khad-Supa and Sisodra villages.	2,224	457,625
		C—Mota, Rampra, Varad, Khoj, Vankaner, Moti-Farod, Siker, Pathron and Haripura villages.	3,797	1,001,775
		D—35 villages in Hansot Group Co-operative Cotton-Sale Society.	5,273	Not purchased.
			13,543	1,964,135

The 23,746 lbs. of seed obtained on Surat Farm in Stage II-B was distributed to the Group villages (Inner reserved area) shown in Stage III for the 1932-33 crop.

Out of the total quantity of 2,255,918 lbs. of seed obtained in Stages III and IV, 723,045 lbs. were sold, through 20 depots, for general cultivation in British villages in 1932-33; while 1,532,873 lbs. were sold to adjacent Indian States, including Rajpipla, Chhota-Udepur, Jambughoda and Baroda. In addition to this 202,350 lbs. of general non-controlled seed was purchased for Rajpipla State from Surat to meet an unexpected

demand. The whole of the seed-cotton 4,846,464 lbs. grown in stages III and IV was ginned by the marginally noted Firms at the centres noted against each Firm. The resulting 1,982 candies of cotton were sold by the Department, on behalf of the seed-growers, at Rs. 239 per candy when the Broach Good rate at Bombay was Rs. 188, and the Department purchased all the resulting seed at a price which was a little above the market rate. The incidental expenditure incurred upon the handling, transport and sale of this seed was met from a subsidy granted by the Indian Central Cotton Committee, which amounted to Rs. 6,962. This sum also covered the pay and travelling allowance for the additional staff maintained during the year under report.

Name of the Firm.	Name and place of ginnery.
1. Sheth Jamshedji N. Kapadia.	Surat.
2. Messrs. Tata Sons & Co. ..	Navsari.
3. Messrs. Patel Bros. ..	Bardoli.
4. Sheth Dajibhai U. Patel ..	Sisodra.
5. Sheth Bamanshaw J. Jambusara.	Hansot.
6. Sheth Motibhai Raghavji	Kosamba.

Rice.—The Konkan is the principal Division for the Department's rice seed-supply operations. As explained on page 21 of last year's report there are three principal tracts—

I. Thana and Kolaba districts.

II. Ratnagiri District.

III. Kanara District.

Each of these tracts is further divided into three zones representing the following types of rice—

A. Early.

B. Intermediate.

C. Late.

The new system of seed distribution, introduced in 1928-29, consists in appointing ten registered seed-growers per taluka per season. These growers are changed from year to year. Seed of improved strains is supplied to each registered seed-grower at half the market rates on the following conditions :—

(1) The Department of Agriculture shall be permitted to rogue (i.e. purify) the crop ; and

(2) The seed-grower shall make the best half of the produce available as seed to his tenants, if any, and other growers at the market rate obtainable for it.

In the year under report there were 75 seed-growers in Thana and Kolaba districts with an aggregate area of 550 acres sown with 16,820 lbs. of improved Kolamba rice. On the basis of half the produce there should have been 1,000,000 lbs. of seed available for distribution, but owing to rain-damage in October and November 1931 only 300,000 lbs. of seed was actually available. This quantity is sufficient to sow 10,000 acres in 1932-33. This seed was distributed through the marginally noted agencies. The pedigree seed supplied to these seed-growers is produced on 44 acres of land placed at the disposal of the Department by the Trustees of the Pisal Land Trust. In this way it was possible, in the year under report, to produce the marginally noted quantities of seed, which is sufficient for sowing 500 acres of seed-growers' land.

1. Registered Seed-growers.
2. Landlords.
3. Traders.
4. Agricultural Requisite Societies.
5. Grain Depots.
6. Taluka Development Associations.
7. Revenue Officers.

Name of strain.	Quantity of pedigree seed produced in 1931-32.
K. 42	10,520
K. 79	2,571
K. 184	4,795

In Ratnagiri District 5,078 lbs. of pedigree seed was supplied to seed-growers for sowing 85 acres. The produce was estimated at 125,000 lbs. of which half was available for general distribution, sufficient to sow 1,000 acres (of this coarse variety). Similar work is in progress in Kanara District, and a rice-seed distribution scheme has been prepared for Dharwar District.

The Departmental seed-supply operations in wheat, groundnuts, jowar, bajri, tobacco and nagli are on a smaller scale, but it is satisfactory to record that, in the case of groundnuts, in particular, natural spread has accounted for huge areas being brought under new varieties, introduced by the Department, e.g. the Spanish Peanut variety now occupies an area of about 423,000 acres in Khandesh, while small Japanese and Spanish peanut varieties together occupy about 56,700 acres in the Panch Mahals. The Department is now introducing the Spanish Peanut variety into the canal zone of the Deccan where 24,000 lbs. of seed was distributed in the year under report.

Fruit Stock Supply.

The area under Fruit is increasing ; thus in the year under report the acreage rose to 59,403 acres as against 57,662 acres

in the previous year. The Department is assisting this movement by making available reliable fruit stock, not only to the general public, but to the professional nursery-men who are the proper intermediaries in such operations.

The Horticulturist to Government supplied over 9,000 plants to the general public and professional nursery-men in the year under report. The Washington Papaya accounted for nearly 6,000 of these plants.

Some of the Taluka Development Associations are taking a hand in this work through the establishment of nurseries, e.g. the Satara Association distributed about 20,000 plants, mostly plantains, in the year under report.

Seed-grading.

In certain districts, more particularly in the Deccan, remarkable results have been obtained with graded jowar seed. In the year under report the Department, with the aid of local agencies, arranged for the grading of jowar seed on a large scale as shown in the margin. In addition 45,960 lbs. of wheat seed and 7,110 lbs. of bajri seed were graded. It is estimated that about 62,000 acres were sown with graded seed in the year under report.

Name of District.	Quantity of jowar seed graded in lbs.
Sholapur	326,997
Poona	46,390
Ahmednagar	24,650
Satara	49,244

In the year under report certain cultivators of Barsi Taluka of Sholapur District, where the Department has done much propaganda, graded 20,000 lbs. of groundnut seed, using a specially prepared sieve, and the increased yield obtained ranged from 14 to 25 per cent.

Premium Bull Supply.

One of the greatest services that the Department can render to Agriculture is the improvement of cattle through the supply of superior bulls for breeding purposes, provided they have the draught qualities demanded by the plough-man.

The following table indicates the expansion of these operations both in the seven intensive breeding zones, described

on page 24 of last year's report, and in the rest of the Presidency :—

Premium Bulls.

Name of Tract.	Number of bulls.			
	Working on 1st July 1931.	Whose 3-year period expired in 1931-32.	Issued in 1931-32.	Working on 1st July 1932.
	Intensive Breeding Zones.			
Chharodi	30	8	9	31
Surat	9	2	2	9
Satpura	6	2	7	11
Nasik	..	..	..	..
Sholapur	11	1	18	28
Belgaum	3	1	..	2
Bankapur	19	5	6	20
Total ..	78	19	42	101
	The Rest of the Presidency.			
Gujarat	8	..	10	18
North Central Division	2	..	10	12
South Central Division	..	..	1	1
Southern Division	2	..	1	3
Konkan	2	2	2	2
Total ..	14	2	24	36
Grand Total ..	92	21	66	137

The reason for dividing the operations into these two divisions is to enable the Livestock-Expert to concentrate his own special activities in those localities best suited for cattle breeding, where he can produce greatest results. The operations in the rest of the Presidency are controlled by the several Deputy Directors of Agriculture who work in close consultation with the Livestock-Expert, while the whole scheme is co-ordinated by the Director of Agriculture. It is gratifying to record that the operations have expanded by fifty per cent. in the year under report, due mainly to a grant from the Sir Sassoon David Trust. The demand for premium-bulls is greater than the number that can be bred by the Department, and a certain number have to be purchased. This is unsatisfactory in that the pedigree of the purchased bull is generally not known, but a new plan has been adopted in the year under report.

There are now a considerable number of off-spring from premium bulls in the Intensive Breeding Zones, and the new plan consists in buying-in the best of these young bulls and rearing them on our farms. This is of special importance in those tracts, like Gujarat, where early castration is customary and where the potential benefits from premium bulls are being partially nullified. After rearing, these bought-in bulls will be made available for distribution in the rest of the Presidency.

It is difficult to express in terms of money the value of the services rendered through premium bulls, but the Livestock-Expert reports that the market value of the progeny is as much as 30 per cent. more than that of ordinary well bred stock.

Another important development in the service of cattle breeding, has marked the year under report. This is the introduction of registration of pedigree stock. Herd-books have been prepared for all the principal breeds. This has been rendered possible through the marking of cattle by the tattoo method.

Mention should be made here of the work in cattle breeding undertaken by a private gentleman, namely Mr. Fattesingrao Deshmukh of Ner in Dhulia Taluka. He is maintaining a herd of 60 Killari cattle and Government has placed 150 acres of grazing land at his disposal. He has commenced to issue breeding bulls.

Two Taluka Agricultural Development Associations in Khandesh, acting under the guidance of the Department, have taken up cattle-breeding. They have chosen the Nimari breed and have established herds of 20 cows each.

The Gowrakshak Mandali at Kandivlee continues to do good work on the Gir-breed under departmental guidance.

Poultry Industry.

The importance of the poultry industry in this Presidency is not as fully realized as it should be. The Deccan, in particular, is a great egg-exporting tract, but poultry are important everywhere. The chief service which is being rendered to this industry is the distribution of stud-birds of superior breeds. As our resources are limited we are at present concentrating most of this work in selected localities. In addition to those centres mentioned on page 25 of last year's report, the following areas are receiving special attention (1) Satara District and (2) Palghar Taluka of Thana District.

The following statement summarizes the work done during the last two years :—

Distribution of Stud-Birds.

Name of Division.	Number of stud-birds put out in 1930-31.	Number of stud-birds put out in 1931-32.
Northern Division (including Bombay and suburbs)	11	21
North Central Division	2	3
South Central Division	17	16
Southern Division	1	1
Sind	....	4
Indian States	....	3
Total ..	31	48

Special mention should be made of the fact that the District Local Board, Satara, has engaged a poultry expert and has arranged for the supply of 43 cocks and 64 hens of the Leghorn and Rhode Island Red breeds.

Land Development.

This is perhaps the most fundamental of all agricultural improvements. If the land is under-developed for any reason then the return from it is permanently less than it need be. In this Presidency the most important form of land development is embanking to conserve the rainfall and prevent erosion. The practice is an old one, but the Department has been able to demonstrate that embankments (tals) are generally designed wrongly, which leads to much wasted effort and money through breaches, etc. Several of the District Agricultural Overseers have been specially trained in this class of work and their services are in keen demand for preparing plans and estimates and for advice upon alignments and the construction of waste weirs. Thus in the year under report plans and estimates were prepared for 32 schemes estimated to cost Rs. 22,500 in 24 villages of the Bijapur District. In Dharwar and Belgaum districts, taken together, 30 schemes estimated to cost Rs. 25,720 were prepared.

The demand for this service is growing rapidly, and the available staff can only cope with a small fraction of it as will be gathered from the following tabular statement for the Deccan districts.

Statement showing the position of applications with the Bunding Officer, South Central Division, Poona, during the year 1931-32.

Serial No.	Name of District.	Tagai loan applications.					Private applications.				
		Balance from last year.	New.	Total on hand.	Disposed of.	Balance for next year.	Balance from last year.	New.	Total on hand.	Disposed of.	Balance for next year.
1	Poona	3	..	3	3	..	17	3	20	2	18
2	Sholapur	9	5	14	8	6	51	12	63	6	57
3	Satara	4	..	4	..	..	10	4	14	1	13
4	Ahmednagar ..	2	6	8	6	2	14	6	20	6	14
	Total ..	18	11	29	17	8	92	25	117	15	102

Mechanics.

Three of the four Deputy Directors of Agriculture have on their staff a Mechanical Assistant whose duty is to deal with mechanical problems, not demanding the attention of the Agricultural Engineering Section. They assist the Deputy Director in advising the public upon the selection of farm machinery like pumping-plants and cane-crushers and oil engines, and in preparing plans and estimates; they also undertake the erection or installation of these plants according to terms approved by Government. The Agricultural Engineer to Government is referred to in cases of difficulty. This kind of assistance is much appreciated, and the development of agriculture has been considerably aided thereby in certain tracts, such as the Deccan Irrigation Zone, where there are now 90 power cane-mills.

Thus notwithstanding the present severe economic depression, there were 32 applications for mechanical help from farmers in the Deccan in the year under report, and the mechanical assistant visited 30 places. These applications were made up of 7 in connection with power cane-crushers, 14 in connection with pumping water from rivers and 9 for pumping water from wells. The most important erection work was the installation of a 22 B.H.P. oil engine to drive a " 92 " Chattanooga cane-mill purchased by the Co-operative Power Cane Crushing Society at Nimbuth on the Nira Left Bank Canal.

In the Karnatak there were 24 applications for the preparation of plans and estimates of pumping plants and 17 were dealt with. In this Division the public are making increased demands for this kind of help, especially in Bijapur and Belgaum districts.

In Gujarat the mechanical assistant dealt with 16 out of 19 applications received for advice and help with regard to new plants, and he visited 11 existing pumping plants to give advice with regard to repairs.

Crop Protection.

Fencing.—In certain parts of the Karnatak the pig-menace is the dominant agricultural problem as crops cannot be grown without protection. In this connection the Department has been assisting the public to fence their lands and several co-operative schemes have been promoted, but the need for legislation is keenly felt to deal with small minorities who, through refusal, block these useful schemes. The Tegur fencing project in Dharwar District is a case in point; here the papers are ready for registration and 92 out of 96 cultivators concerned have agreed to come into the scheme, of whom 90 have actually paid their share-capital and these people want to get the work started. This project is for the enclosure of an area of 1,300 acres where such valuable crops as sugarcane and groundnuts could be grown if protected. At other places during the course of the year fencing material measuring 3 miles and costing Rs. 3,600 was purchased by individual cultivators, and the Department gave advice as regards its erection.

Pig-killing Campaigns.—The Department continued to assist the agricultural public, especially where there are organized bodies, to organize campaigns for the destruction of wild pigs which cause such enormous damage to crops in certain tracts. The following statement tabulates the assistance given during the year under report :—

Serial No.	Locality.	Work done.
1	Godavari Left Bank Canal ..	A campaign was organized in July 1931.
2	Turkewadi in Belgaum District.	A campaign was organized in September 1931 through the Village Panchayat; and papers were prepared for the registration of a Co-operative Crop Protection Society.

Serial No.	Locality.	Work done.
3	Kalyan and Murbad in Thana District.	A campaign against pig and nilgai was organized in October 1931 through the Taluka Local Boards and Taluka Agricultural Development Associations.
4	Kolimb and Mulgaon villages in Kalyan taluka of Thana District.	A campaign against pig and nilgai was organized in October-November.
5	Mungi and Hatgaon villages in Shevgaon Taluka of Ahmednagar District.	A campaign was organized against pig and deer in November-December-January 1931-32 through the Co-operative Credit Society of Hatgaon.
6	Sinhgad in Haveli Taluka of Poona District.	A campaign was organized in May-June 1932 with the co-operation of the District Local Board, Poona.

It is to be noted that the effect of a well conducted campaign lasts for a considerable time. Thus the President of the Palshi Kolawadi Shikar Panchayat Committee and Member, Taluka Development Association, Koregaon, reports that the effect of the work during the past 4 years is very marked; for example the shout of a single watchman at night is sufficient to protect 200 acres of crop.

It is satisfactory to note that Taluka Agricultural Development Associations are developing this kind of work. Thus in the year under report the Raver Taluka Development Association (East Khandesh) employed two men for six months on this job, and they destroyed 90 pigs; the expenditure on pay and gunpowder was Rs. 156 while the villagers supplied food, etc., free to the servants.

Deer-killing Campaigns.—The campaign against deer was continued at Mallapur and other villages in the Ron and Gadag talukas of the Dharwar District. Subscriptions were collected from the people, and 119 deer were destroyed while many more were driven off: some 21,000 acres of crop were protected.

Rat destruction.—The rat pest was serious in Khandesh and certain parts of Gujarat in the year under report. Poisoning is the only action that can be taken in localities where the soil cracks and makes fumigation impracticable. In the year under report some 1,100 packets of arsenical poisons were issued in Gujarat, and similar work was undertaken in Khandesh.

Anti-Jowar Smut action.—The work of treating jowar seed before sowing it, with the object of preventing smut-disease,

was continued through several agencies. In Khandesh 6,733 sulphur packets were supplied to cultivators, and a special campaign was organized in Shahada taluka by the Taluka Development Association. In the Deccan 4,000 packets were distributed, and in addition a large volume of jowar seed (141,330 lbs.) was actually treated with sulphur, which was sufficient to sow 20,000 acres. In Gujarat 1,560 packets were issued.

Mango-blight prevention.—The method of dusting mango trees to prevent mango-blight has taken firm root in Ratnagiri District. Some 62 dust guns were used and 7 tons of sulphur consumed in the Vengurla, Malvan, Devgad and Ratnagiri talukas. This method of protection is spreading to other centres.

Betelnut-Koleroga-blight prevention.—The Supari Palm suffers from a serious disease called "Koleroga", but it can be controlled by spraying with Bordeaux mixture, as advised by the Department of Agriculture. In the year under report the people sprayed 576 acres of Supari as shown in detail in the margin. Spraying materials worth about Rs. 2,600 were used.

Name of Taluka.	Acreage of Supari Palms sprayed with Bordeaux mixture in 1931-32.
Siddapur	135
Sirsi	160
Yellapur	60
Honawar	209
Kumpta	12

Betel-vine protection.—A devastating wilt-disease broke out in the Bassein betel-vine gardens some 4 or 5 years ago, and it has since spread to Kelwa Mahim, a village in Palghar Taluka, where the crop is also of great local importance. The treatment of the soil with Bordeaux mixture, provided the precaution is taken to lower the vines in the month of May, has given complete protection from this disease, and the people are adopting this protection method under the guidance of the Plant Pathologist.

Grape-vine protection.—Mildew is the great enemy of this crop, and at one time the Nasik grape-industry was threatened with destruction, but spraying with Bordeaux mixture, combined with dusting with sulphur, gives complete protection if the correct technique is observed. In the year under report the season was peculiarly favourable to this disease owing to

late rains and many gardens suffered severely because the prescribed instructions were not followed in detail. Fortunately a large area of 25 acres of vines in the Godrej Vine-yard at Nasik was treated in accordance with the instructions of this Department and a bumper harvest was obtained, in marked contrast to certain other gardens in which the crop was abandoned.

Protection of other crops.—The Department has worked out analogous treatments for protecting other staple crops, such as potatoes, which have been adopted by the people to their great advantage.

In the neighbourhood of Belgaum the cultivators, a year or two ago, were on the point of giving up potato-cultivation owing to the damage caused by the potato worm and jassids. The petrol-fumigation method of destroying the former and lime-sulphur spraying against jassids have however given them effective control over these pests.

Marketing Produce.

Protected areas.—It is well known that certain tracts have a high reputation for the quality of their agricultural produce, but, owing to the greatly improved transport facilities, there is a considerable temptation for a certain class of trader to import inferior produce to mix with the local good article. This practice, if pursued, ultimately leads to the tract losing its high reputation. The Government of India, on the recommendation of the Indian Central Cotton Committee, accordingly decided to legislate against this malpractice; and the Cotton Transport Act (1923) was put on the Statute Book. This Act makes it illegal to import cotton into areas which have been declared protected under the Act. Several such areas have been so protected in the Bombay Presidency. In the Karnatak there are three such areas and the working of the Act is satisfactory. In this division some 20 check stations have been established and no cotton is allowed to enter either by road or rail without a license. The work of issuing licenses and inspecting cotton imported under license has been systematised, and rules and instructions have been drawn up for the guidance of the inspecting staff and the traders: thus 89 licenses for rail imports and 746 licenses for road imports were issued in the year under report from the Department's office at Gadag.

In Gujarat the working of the Act has not been so satisfactory as attempts have been made to make it ineffective through the

illegal introduction of cotton-seed from the north, and the propagation thereof within the protected areas. Adulteration is the consequence and the relative price of cotton grown in the south of Surat District is falling. The position is serious but the Department is doing what it can to reduce this cultivation of inferior cotton. Another important difficulty is that the country lying to the north of the Tapti cannot easily be cut-off from its principal market, Surat. The position is further complicated by the fact that the improved strain "1027 A.L.F." has a lower ginning percentage than another improved strain "1A," and, as the premium for the former is not very attractive many growers feel that the latter cotton is a better business proposition to them. This question is now being fully investigated through careful comparative trials in the countryside.

Regulated Cotton Markets.—As reported on page 31 of last year's report the first Regulated Cotton Market, under the Bombay Cotton Markets Act, 1927, was organized at Dhulia in December 1930. The object of this Act is to remove the many abuses which are associated with the cotton markets of this Presidency, especially secret sales, false weighments, arbitrary allowances and deductions for alleged defects, etc., etc. The year 1931-32 represents the second year of the working of this market. During this year, from 1st September 1931 to 30th June 1932, the total number of arrivals was 35,765 carts against 33,914 carts in the preceding year (excluding arrivals between 1st September and 30th November 1930), and the receipts from fees and licenses amounted to Rs. 6,175-13-0 against Rs. 8,023-3-0 in 1930-31. This reduction in receipts was due to the decision of the Committee to reduce the fee on carts from 2 annas to 1½ annas. The Superintendent of the market settled 609 disputes while the *ad hoc* sub-committee settled 19. Preliminary steps have been taken to open a Regulated Market at Amalner, while plans for opening regulated markets at other centres are under consideration.

Grading Cotton.—The Department assists the Hubli and Gadag Co-operative Cotton-Sale Societies to grade their seed-cotton according to ginning percentage. In the year under report 7,165 dokras (1 dokra=336 lbs.) of Jayawant cotton and 12,536 dokras of Gadag No. 1 were graded. The superior ginning grades of cotton secure appreciably higher prices, e.g. the top grade "Jayawant" cotton with a ginning percentage of 28·4 secured a price of Rs. 130 per naga (1,344 lbs. seed-cotton) when the price of ordinary bazar cotton (mixture of Kumpta and Dharwar No. 1) was Rs. 120-123; and similarly

top grade "Gadag I" cotton with a ginning percentage of 34 secured a price of Rs. 170 per naga against Rs. 155 to 160 for ordinary Dharwar-American cotton (mixture of Dharwar-American and Upland).

Grading Fruit.—Fruit is marketed by the grower in a very primitive manner in this Presidency. The art of grading is almost unknown. As a result of Departmental propaganda for grading mangoes two Co-operative Societies have recently been registered—one at Malvan and the other at Vengurla both in Ratnagiri District. These Societies together with the existing one at Ratnagiri itself make up three societies which are interested in the grading of mangoes. In the year under report the Department lent each of these societies an expert grader. In all some 10,000 parcels of graded mangoes were despatched to Bombay and other places by these Societies, but the market was upset owing to the Bombay riots, and the conditions were unfavourable for obtaining good prices for mangoes in the year under report, and rates ruled some 50 per cent. below those obtainable in the preceding year. However the premia for the superior grades over the inferior grades were substantial as may be gathered from the tabular statement on page 186 of this report.

In this connection it is satisfactory to be able to point to an improvement in packing which has been adopted as the result of departmental propaganda. Several mistries at Ratnagiri have taken up the work of preparing small boxes to take the place of baskets and they are now preparing some 18 to 20,000 such boxes per annum.

Exploring New Markets for Produce.—A large scale trial of shipping mangoes to London was conducted in the year under report with a grant of Rs. 4,500 from the Imperial Council of Agricultural Research. Altogether ten consignments were sent at intervals of a week throughout the mango season (from 23rd April 1932 to 25th June 1932). Each consignment consisted of about 82 trays containing about a dozen mangoes each. The average cost of landing a mango, by the sea route, in London was annas 5 and pies 6 and the average sale price was annas 8 and pies 3 per fruit. The trial showed that mangoes if carefully selected in India and suitably packed and stowed at a low temperature, can be shipped to London very successfully. The loss in transit was 12·65 per cent. due to bad handling and unsuitable storage conditions.

It is now necessary to work out in India the optimum temperature conditions and to investigate such problems as stage of maturity, variety and locality in order to provide the

public with the necessary information to ensure the commercial success of an expert industry, as this depends upon the commercial storage life of the fruit which is governed by the factors mentioned above. With this object in view a Research Scheme has been submitted to the Imperial Council of Agricultural Research and it is of much interest to record that other Provinces including Madras, the United Provinces and Bihar have arranged to participate in this research scheme through sending their best varieties of mangoes for testing.

Miscellaneous Services.

Chemical Analyses.—The Agricultural Chemist's section analysed 75 samples for the public in addition to 660 samples received from Government Departments. The materials analysed for the public consisted mainly of manures, waters and soils.

Tagavi Loans.—In the Deccan the Revenue Department submitted a large number of tagavi applications for constructing field embankments to this Department for advice; and the Deputy Director of Agriculture, South Central Division, disposed of 17 and had in hand another 12 applications in the year under report. Similarly a sum of Rs. 28,305 was obtained in the Karnatak for 28 embankments schemes.

Tagavi amounting to about Rs. 8,000 was obtained in the Dharwar District in connection with Tractor ploughing.

Supply of Agricultural Requisites.—The seed-supply has been dealt with above, while implements and fertilizers are mainly supplied by Firms and Taluka Agricultural Development Associations. As regards other requisites, reference should be made to insecticides and fungicides. Thus in the year under report the Department supplied 14 tons of sulphur to the cultivators of Bulsar and Pardi talukas of Surat District in addition to the sulphur packets for use against jowar smut mentioned above.

Concessions obtained for Agriculturists.—The Advisory Committees for (1) Railways and (2) Forests are doing useful work. In the year under report the Deputy Director of Agriculture, Southern Division, Dharwar, who is a member of the Forest Committee, succeeded in securing the concession of free timber for implements up to a value of Rs. 2-8-0 per annum per cultivator residing in forest villages.

Training Classes for Adults.—During the year under report 55 classes extending over short periods, varying from one to

three days, were held in the Deccan Canals area. The instruction is given partly in the form of "talks" and partly through the practical demonstration of improved methods. The attendances at such classes varied from 50 to 200. A special 10-days class, dealing with irrigated crops, was organized at Malsiras. This was a very successful undertaking as the class was attended by 143 regular students and 150 visitors. Mr. Govindrao Ganapatrao Pawar placed his farm at the disposal of the Department for the practical training. An examination was held at the conclusion when 48 passed out of 50 persons who appeared. A Horticultural Class lasting for a fortnight was organized at Dhulia in January, which was attended by 42 persons. A Horticultural Class was held at Anand in Kaira District for a week in October and it was attended by 143 persons, 85 of whom appeared for the examination and 76 passed.

Under this category of service mention may also be made of the instruction given at Anand in the manufacture of lime-juice and guava jelly, when 200 persons attended.

Horticultural classes were also held at Karwar and Honawar in the Kanara District.

A Practical Course in Horticulture is provided at Ganeshkhind Botanical Gardens. This extends over a year and is popular. It attracted 11 students in the year under report.

At Navalpada in Thana District a 3-days class in general agricultural improvements was attended by 50 agriculturists.

Organized tour for Agriculturists.—Perhaps the most useful piece of work done under this category was the organization of a tour for selected sugarcane agriculturists in the United Provinces and Bihar with the special object of enabling these people to acquaint themselves with the working of sugar factories. The programme was very kindly arranged by Mr. R. C. Srivastava, Sugar Technologist to the Imperial Council of Agricultural Research, and the party which consisted of eight prominent Deccan cane-growers was conducted by the Deputy Director of Agriculture, S. C. D. There are signs that this tour is going to have fruitful results as a small group of cane-growers has raised the necessary capital to finance a factory.

CHAPTER III.

AGRICULTURAL RESEARCH.

As a result of the impetus given to Agricultural Research by the Royal Commission on Indian Agriculture it has been possible for this Department to promote several new research schemes with funds mainly provided by external bodies such as

The Imperial Council of Agricultural Research,

The Indian Central Cotton Committee and

The Sir Sassoon David Trust.

The most important new schemes include—

I. The Sugarcane Research Scheme for the Bombay Deccan (including Rotation Crops).

II. The Dry Farming Research Scheme for the Bombay Deccan.

III. The Cold Storage Research Scheme for Fresh-Fruit Export.

IV. The Khandesh Cotton-Breeding Scheme.

V. The Broach Cotton-Breeding Scheme.

All of these except II and III which are now before the Governing Body of the Imperial Council, have been launched during the course of the year.

VI. The Virus Diseases Research Scheme mentioned on page 38 of last year's report has been postponed owing to financial reasons, at the request of the Imperial Council of Agricultural Research.

Among the older research schemes the following reached completion in the year under report.

VII. The Surat Cotton-Physiological Research Scheme.

VIII. The Dharwar Cotton-Wilt Research Scheme.

IX. The Bajri-Breeding Research Scheme.

X. The Mango-Blight Research Scheme.

XI. The Improvement of Grazing Lands Research Scheme.

The results of these schemes have been or are being written-up.

In addition to these schemes the Department is conducting research upon a number of problems, the most important of which will be referred to below.

Sugarcane.

A good site at Padegaon on the Nira Right Bank Canal near Lonand Railway Station, M. & S. M. Railway, has been secured for the Sugarcane Research Scheme, and certain P. W. D. buildings, in the vicinity (2-3 miles distant), no longer required by that Department, have been secured for housing the staff and providing office and laboratory accommodation. In addition some temporary buildings have been erected on the site which has also been fenced and is being laid-out for experimental work. The superior staff was appointed in June-July 1932. This is a big scheme, having for its main objective the production of cane at a much lower price than has hitherto been prevailing, so as to render it possible for Peninsular India to produce sugar for the Indian market in competition with the north of India, and ultimately in competition with foreign cane-sugar producing countries like Java. The Tariff Board consider that cane should be produced at annas 4 to annas 5 per maund if India is ultimately to hold its own against world competition.

The important varietal work upon cane which has hitherto been carried out at Manjri, was transferred to Padegaon in the year under report, where in addition to other varieties a number of Coimbatore canes are being tested. In other respects the research programme will not be launched until 1932-33.

Dry-Farming.

A deficient rainfall is one of the most formidable problems in Indian agriculture taken all over. The country which embraces the eastern section of the Bombay Presidency Deccan and the western section of Hyderabad State and portions of Madras, constitutes one of the largest rain-deficiency zones in India. Canal irrigation is being developed but it can only serve a very small percentage of the gross cultivated area, hence the importance of finding out ways and means for the better utilization of the rainfall. Preliminary research shows that much can be done in this connection, but the scheme now awaiting sanction, contemplates putting this investigation on a broader and more exhaustive basis.

Fresh-Fruit Export.

Preliminary investigation carried on during recent years, but more particularly in the year under report, indicates that there is no insuperable obstacle in the way of establishing an

export trade in Indian fresh-fruit. With the aid of a grant from the Imperial Council of Agricultural Research some ten large scale consignments of fruit were sent to London during the 1932 Mango Season with very encouraging results. Before, however, an export trade can be planned on a scientific basis it is necessary to carry out certain investigations for the purpose of ascertaining the commercial storage life of our fruits. These investigations include such problems as the following :—

(1) the most suitable export varieties,

(2) the stage of maturity at which the fruit should be picked,

(3) the locality which produces fruit most suitable for export,

(4) the optimum temperature at which fruit should be kept during transit,

(5) the best methods of packing.

It is estimated that these investigations will occupy about three years, and a detailed research scheme has been prepared and placed before the Imperial Council of Agricultural Research. The Advisory Board of the Council have approved the scheme and recommended it to the Governing Body for sanction.

Cotton-Wilt.

The research scheme which has been in progress at Dharwar for some years has led to the following important discoveries :—

(1) It has been established that this disease, at Dharwar, is caused by the fungus, Fusarium vasinfectum Atk.

(2) It has been shown that this fungus can live within only a narrow range of temperatures 18° to 40° C in the case of agar medium with 28° C as the optimum ; it has also been shown that the optimum soil-temperature for the disease is definitely lower as cotton-wilt is most severe at temperatures ranging from 20° to 27° C.

This is a most important discovery because it enables the plant breeder to test his new strains of cotton under conditions of disease of maximum intensity, through the adoption of a suitable technique which has been worked out. Hitherto these tests had to be conducted under field-conditions removed from the optimum for the disease, thus resulting in plants which merely escaped the disease being regarded as disease resistant. For example the improved Jayawant cotton has proved highly resistant in the field and has accordingly been introduced into

the countryside. But when tested under conditions created by the new technique it has proved highly susceptible to the disease. Hence it is necessary for the plant breeder to produce a cotton which combines the good qualities of Jayawant with real resistance to disease.

(3) It has been shown that the disease can be carried in the seed. This means that it is unsafe to distribute seed from a field in which wilt has been found. This difficulty, however, could be surmounted by heating the seed to the temperature which kills the fungus but not the germ of the seed.

Cotton-Physiology.

The important research scheme conducted at Surat aimed at finding out the reason for the shedding of 80 to 90 per cent. of the buds and bolls and ascertaining how far this loss can be reduced. The main discovery is that the cause is nutritional and that this phenomenon is not due to insufficient moisture in the soil. It has been ascertained that the nitrogen in the cell-sap is relatively much less in the latter part of the season than earlier, and hence the bolls which form in the early part of the season have at their disposal a larger amount of nitrogen than the later bolls. This means that every effort should be made to promote an early crop. There are two principal ways in which action can be taken to this end—

(1) Protecting the crop from boll-worm, *vide* remarks on page 45 below, and

(2) Sowing the seed on ridges or hillocks so as to eliminate the risk of having to sow a second or third time as the result of excessive rainfall, which is a common phenomenon in the Surat tract.

Another important discovery is that the plant is most in need of nitrogen in the latter part of the monsoon and hence manuring should be planned to meet this demand, where this is possible.

Finally certain plant selections have been made which appear to possess the character of retaining bolls more efficiently than the average crop. One of these strains has been registered under the number "43," and it will be further tested by the Deputy Director of Agriculture, Gujarat.

Crop-Breeding.

Cotton.—Cotton-Breeding is in progress at five centres, namely, Surat, Broach, Viramgam, Jalgaon and Dharwar.

At Surat the two best strains so far produced are "1027 A.L.F." and "I A." Comparative trials on the Surat Farm in the year under report resulted in an insignificant difference in favour of I A as regards field performance (yield of seed-cotton). The latter cotton, however, retained its superiority in ginning percentage (39·9 per cent. against 35·5 per cent.). The spinning valuations were 30's for "1027 A.L.F." and 28's for "I A."

In accordance with the plan described on page 41 *et seq.* of last year's report comparative trials with these cottons were also arranged at several centres in the district, which are reported on page 162 of this report, and arrangements for testing the fibre have been made.

The work of the breeder with the object of producing improved cottons superior to those already produced, continues. In the year under report work was mainly concentrated on six hybrids made during the past three or four years.

At Broach the cotton-breeding work has been placed on a satisfactory basis due to a grant from the Indian Central Cotton Committee for a five years breeding scheme. Here the object is to produce a cotton which gins not less than 40 per cent., spins not less than 20's and is resistant to cotton wilt. For this purpose a series of hybrids have been produced in which one of the parents is the strain called "B.D. 8" which appears to be highly wilt-resistant and spins 32's. The other parents consist of wilt-susceptible Goghari strains such as "G.A. 26," "G. 10" and "G.E.^{5}" Jayawant and Commilla have also been used as parents.

At Viramgam the cotton is known to the Trade as "Dholleras." Here the selection "Wagad 8" is the best strain so far produced. This cotton maintained its superiority in ginning percentage over the local deshi cotton in the year under report, but the yield of seed-cotton on the plot was about the same for both cottons. After "Wagad 8" the most promising selection is "F.S. 26-2-1." There are also a number of hybrids under study; the most promising is "Wagad 8 × 1027 A.L.F.". From this hybrid six strains have been isolated. One of these strains "13-11-1" is very promising.

In Khandesh Banilla is the new cotton which has been evolved. This cotton was tested against "N.R.", the former standard cotton, at Dhulia in a comparative trial, having eight replicates. The yields were much in favour of N.R. but as the season was very abnormal these results should be

taken with caution. The ginning percentage of Banilla was 38 per cent. against 35 per cent. for N.R. The spinning report showed that the fibre was suitable for 21's warp and was $\frac{7}{8}$ths of an inch long. The cotton breeding work in Khandesh has now been transferred to Jalgaon in order to obtain conditions suitable for breeding a wilt-resistant cotton. A research scheme with this object in view has been sanctioned for five years, which is partially financed by the Indian Central Cotton Committee. The objective is a cotton which embodies a high yield of seed-cotton with a good ginning percentage and a spinning capacity of 20's, if possible, with resistance to wilt. Side by side with this work selections in Neglectum cotton will be made with the object of obtaining a still better strain of "N.R." with the additional character of wilt-resistance. At present "N.R. 6" is the best of these Neglectum (Roseum), strains having a ginning percentage of 40 and giving a good acreage yield. "N.R. 5" though possessing wilt-resistance and a high ginning percentage, is not such a good perfomer in the field.

At Dharwar Jayawant cotton is the best strain so far produced. In the year under report it yielded at the rate of 815 lbs. of seed cotton per acre as against 715 lbs. by Kumpta. It also gave a ginning percentage of 27 per cent. as against 25 per cent. by Kumpta; while the damage sustained from wilt was only 1·2 per cent. as against 12·5 per cent. by Kumpta. In addition the breeder has some promising new strains coming on. The breeding work at this station has recently been reorganized and, in future, wilt-resistance will be made the basic character aimed at in the breeding of improved cottons, because it has been ascertained that Jayawant cotton loses its resistance when exposed to conditions rendered very favourable to this disease by artificial means.

Rice.—Rice-breeding is in progress at four centres:—

Karjat in Kolaba District;
Ratnagiri in Ratnagiri District;
Kumpta in Kanara District;
Mugad in Dharwar District.

At Karjat the strains "K 42" and "K 266" continue to be our best late Kolamba varieties. The former retains its yield supremacy while the latter, being a finer variety, fetches a higher price, namely, Rs. 45 as against Rs. 40 to 42 for "K 42." "K. 42" is suitable for the Kolaba District while "K 226" is suitable for north Thana. Plans have been made for producing a strain superior to "K 42" as

regards the characters of grain-shedding, lodging and grain quality. For this purpose crosses will be made between "K 42" and "K 412" as the latter possesses strong straw and fine grain. It is proposed to take up the improvement of "K 226" on the same lines. Among the early varieties six selections have been isolated from the strain "K 401." Work is also in progress on the improvement of the Zinya and Bhadas varieties. Some of these Karjat rices have been tried in Gujarat and some of them appear to be very promising, e.g. "K 184" which has relatively fine grain, has given good results in Dholka Taluka of Ahmedabad District.

At Mugad in Dharwar District four improved strains of "Mugad" rice have been produced, and in the year under report they yielded from 12 to 25 per cent. more than the local check varieties. These are :—

No. 161 in the early class ;
Nos. 81 and 249 in the intermediate class ; and
No. 141 in the late class.

Similarly three improved strains of Antersal rice have been produced. These are :—

No. 67 in the early class ;
No. 90 in the intermediate class ; and
No. 200 in the late class.

Selection work has been commenced on the Dodagya variety while it is proposed to take up work on the Sundersal variety when this can be arranged. Several improved strains of rice have also been produced at Kumpta and Ratnagiri.

Wheat.—The Nasik-Khandesh area is the most important wheat tract in the Presidency and the wheat-breeding work is conducted on a plot of land owned by the Department at Kundewadi in Niphad Taluka in Nasik District. The Bansi variety of wheat is grown in this tract and several pure strains have been isolated of which No. 103 gave the best yield in the year under report. But in East Khandesh the strain No. "162" has attracted attention and the area sown with it has reached 600 acres in Shahada Taluka, while strain No. "168" is also liked in the same locality. Strain No. "224" has proved popular in West Khandesh. A hybrid wheat obtained by crossing Bansi with Kala-Khapali is also under study. These are called Bansipili strains and among them Nos. "808" and "809" have given good results in village trials. The former possesses large grain with attractive lustre. This variety has also been given a trial in the Bhal tract of Ahmedabad District with indecisive results.

Tobacco.—Tobacco-breeding is conducted at Nadiad, and so far " G 6 " is the best strain of the Gandiu variety produced while strains " P 45 " and " P 28 " are the best strains so far isolated from the Piliu variety. Hybridization is also in progress and two promising cultures from a cross between Gandiu No. 6 and Bhengi have been produced; these have been registered as " N 1 " and " N 4 ". Another promising strain " N 10 " is a hybrid between Gandiu " 6 " and Adcock.

Other Crops.—Jowar-breeding is in progress at several centres. The most valuable results, in the year under report, were obtained at Mohol in the East Deccan. In this tract there are some four million acres under Rabi Jowar, and one variety, Maldandi, alone occupies about 1½ million acres. It has been found that this variety is a mixture of two principal types—

(*a*) the long-internode type, and

(*b*) the short-internode type.

The former type is a rapid grower and reaches maturity about a fortnight earlier than the latter. This is a character of the greatest importance in a tract where the rainfall is deficient and soil-moisture is a limiting factor. In such circumstances the plant often fails to produce earheads; and observations show that this is a serious defect in the short-internode type. An experiment conducted at Mohol in the year under report resulted as follows :—

Type of Maldandi Jowar	Strain No.	Total Number of plants	Number of plants which bore earheads	Percentage of plants bearing earheads
Short-internode	"30·3"	422	113	27
Long-internode	"35·1"	446	232	52
Ordinary mixture	..	423	189	45

The most promising long-internode strain of Maldandi so far isolatd is No. " 47·3 ". Work is also in progress on the two varieties Dagadi and Tambada-Gota.

The work on Bajri is now being conducted at Kundewadi in the Niphad Taluka of Nasik District where the Department has a plot of land. Work on castors in Gujarat and groundnuts at Dharwar is also proceeding.

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Cattle-Breeding.

The production of premium-bulls is being carried on at four principal centres :—

Chharodi in Ahmedabad District ;
Surat in Surat District ;
Bankapur in Dharwar District ;
Kandivlee in Thana District.

At Chharodi and Surat the breed is Kankrej ; and excellent bulls are being produced. The use which is being made of these bulls is described on page 242 of this report. The strength of the Chharodi herd is 282 head, and the breeding policy is the production of a first class draught animal, more particularly as regards size and type. At the same time the milking capacity of the cows is being developed without interference with the primary objective. In the year under report two heifers have yielded over 5,000 lbs. of milk in their first lactation. Progress has also been achieved in shortening the period of maturity. Recently a new technique in breeding has been adopted. This consists in using young bulls for service as early as possible in order to obtain a large number of offspring, the performance of the females providing the measure of the sire as regards milk. Simultaneously the performance of the sisters of bull also provides a valuable measure of the bull's breeding value for milk. Altogether 36 bull-calves and 24 cow-calves were produced during the year and 16 bulls were issued on the premium system. Similarly 13 bulls were issued from the Surat Farm in the year under report.

At Bankapur the strength of the herd is 124, a considerable number of stock being cast as the herd was originally not pure, but the young cow-herd is now very uniform. During the year 20 bull-calves and 19 cow-calves were produced. A very noticeable improvement at this institution is the increased weight of the calves at birth, the average weight now being 43 lbs. Substantial progress has been made in eliminating the pendulous sheath in the case of the bulls which was such a noticeable defect a few years ago. Similarly the herd is assuming a fixed colour. It is felt that keeping the young bulls in separate pens has contributed a good deal to the prevention of the sheath becoming pendulous which appears to be partly an induced and not merely an hereditary character. Progress is also being made towards earlier maturity and more regular calving in this herd.

In addition to the four principal centres for bull-breeding mentioned above there are two small breeding farms at Sangvi in West Khandesh and Tegur in Dharwar District.

At Sangvi the Tapti-Khillari is the breed worked on, but owing to in-breeding this herd has been showing signs of deterioration, and it has been decided to introduce some Mhaswad-Khillari blood for the purpose of improving the constitution and bone of these cattle. At Tegur the object has been not merely the breeding of cattle but the provision of a type of farming suited to the locality. The tract has a good rainfall and can grow such crops as rice and sugarcane, but their cultivation is hardly remunerative owing to the ravages of wild animals. Grass is the safest crop to grow but it is not easily marketable as hay. Hence the object of this institution is to turn the grass into money through the breeding of a good type of bullock, in other words the system of farming being evolved is ranching. It is satisfactory to note that through the use of successive good bulls on a herd which consisted originally of poor indigenous cows a much superior type of animal is being produced, and the people are realizing the possibilities of this type of farming.

The College Dairy also provides facilities for breeding. There are two herds—

(1) The Red Karachi Breed (cattle);
(2) The Surtee Breed (buffaloes).

As regards the Red Karachi Breed several "lines" have been established such as the "King Arthur" "line" and the "Pratap" "line," and we now have pedigree stock of several generations standing.

Similar work is being conducted on Surtee buffaloes, and we now possess some very valuable stock. For example the she-buffalo named "Bhagi" has given an average milk yield of 5,011 lbs. over the last 8 lactations. Arrangements are being made to make the best of the male-offspring of these buffaloes available for distribution as premium-bulls in Gujarat.

An important step in the improvement of cattle-breeding by the public, has been the introduction of registration. Herd-Books for the principal breeds have been established, and the tatoo system of marking adopted.

Cattle Nutrition.

An important feature of the work of the Cattle-Breeding Farms is the work on fodders. A large range of fodders is grown, and their relative values are worked out. For example

at Bankapur the pulse " Kulthi " (Dolichos Biflorus) has been found to contribute a good nutritious fodder to the ration, in addition to serving as a valuable rotation crop.

At Chharodi 460,000 lbs. of silage was made mainly from maize and Jowar at a cost of Rs. 2-7-0 per 1,000 lbs.

At Chharodi the value of " mineral licks " has been investigated and it has been found that the increase in live weight was greater in the case of animals provided with these " licks " than in the case of those provided with common salt, but at present prices, the economic results are practically the same. It is realized, however, that basic minerals rather than proprietary products should be used in such investigations, and it has been decided that the Agricultural Chemist should take up the investigation of the mineral constituents of the herbage plants of our grass lands as there appears to be ground for the view that our natural vegetation is deficient in certain minerals required by cattle.

At the College Dairy an investigation is in progress upon the influence of certain concentrates upon the quality and quantity of milk ; the indications are that Guar (Cyamopsis psoralicides) is more effective than Tur Chuni (Cajanus indicus) in increasing the production of milk. Kulthi (Dolichos biflorus) has given feeding results which appear to be equal to those obtainable from Tur Chuni (Cajanus indicus) which is very much dearer. Arrangements are being made to compare the feeding values of groundnut and sesamum cakes.

Plant Diseases.

Reference has already been made to the Virus diseases of plants and to cotton-wilt. The sulphur treatment continues to be the stock method of combating a considerable number of diseases, as listed on page 49 of last year's report.

In the year under report the environmental conditions in the East Deccan were very favourable to the Rhizoctonia bataticola disease of Jowar. When there is an excess of soil moisture this disease causes young Jowar plants to die in large numbers. This appears to be the first occasion when Rhizoctonia bataticola has been recorded as attacking sorghum, and the problem has now been taken up for investigation.

The work on betel-vine wilt at Bassein continues. In the year under report the monsoon conditions for the fungus Phytophthora sp. were so favourable that the disease broke out in a virulent form, and in many cases it completely destroyed the plantations. The surface of a large number of plots was

treated with Bordeaux mixture according to the following programme :—

Treatment	Time of application
First	Immediately before planting in October-November.
Second	Before the vines are lowered in late May.
Third	About the first week of July.
Fourth	About the first week of August.
Fifth	About the first week of September.

Where this treatment was adopted, in conjunction with lowering the vines in May, the crop remained free from disease. The importance of lowering the vines in May apparently makes the soil more permeable and so enables the Bordeaux mixture to enter the soil and destroy the fungus.

The work on sann-hemp wilt is progressing, and the procedure is to select or breed resistant strains with the aid of a technique which provides the optimum conditions for the disease.

Other diseases under investigation include (1) the powdery mildew of (*a*) peas and (*b*) cumin, (2) cumin blight, and (3) fig rust.

The Sclerospora fungus attacking Jowar has been redescribed as a new species, Sclerospora sorghi (Kulk) Western and Uppal, and it has been found that Sorghum Sclerospora can attack maize.

It has been shown that Sclerospora graminicola is split into specialized races, and that one physiologic form attacks Bajri.

It has been shown that the smut fungus can only infect Jowar grain within a well defined range of soil moistures, namely, 40 to 70 per cent. with 60 per cent. the optimum. These results indicate that if Jowar seed is sown early in the season when there is enough moisture for Jowar-seed germination but not enough for the smut spores to germinate, the incidence of infection will be low. The Plant Pathologist has succeeded in isolating a race of bacteriophage specific for Pseudomonas citri, the cause of citrus canker. This is a matter of much importance because recent investigations indicate a probable relationship between the behaviour of a bacteriophage and that of a plant virus.

It has been found that black stem rust of wheat appears in the Karnatak as early as the middle of November, thus indicating the possibility of black rust oversummering in the Western Ghats, since this rust does not make its appearance in the north of the country before the last week of December.

Soil Fertility and Fertilisers.

The Agricultural Chemist has continued his research upon the natural recuperation of nitrogen by the soil and a third Paper has been prepared for publication in collaboration with the Soil Physicist, Mr. N. V. Kanitkar. This investigation reveals a certain important relationship between the soil nitrogen and certain other soil conditions.

Owing to the peculiar distribution of the rainfall in this country the rabi (cold-weather) crop receives little or no rain, but depends upon the moisture already stored in the soil. This creates a practical difficulty in the use of fertilizers as they tend to remain inert in the surface soil. In order to ascertain the extent of the movement in the soil of the common nitrogenous fertilizers the Agricultural Chemist has been conducting an investigation during the past three years, and a Paper is being prepared for publication which describes the limitations of movement and raises the question whether fertilizers intended for the rabi crop should not be applied during the monsoon.

As explained on pages 50 and 51 of last year's report the Professor of Agriculture undertakes preliminary investigations with new artificial fertilizers in order to ascertain whether there is a *prima facie* case for testing them at other centres. The fertilizers under investigation include

Calcium cyanamide.	Nitrophoska.
Amophos.	Niciphos.

in addition to the old standard fertilizers, namely, nitrate of soda and sulphate of ammonia which serve as a basis of comparison.

The results so far obtained indicate that none of these fertilizers have any value for shalu jowar which is grown in the rabi season, and the reason for this is indicated in the preceding paragraph. The unirrigated kharif crop, bajri, has responded markedly to niciphos, nitrate of soda and calcium cyanamide, but at present prices nitrate of soda alone has proved economic. The two fertilizers niciphos and sulphate of ammonia have given economic results when applied to unirrigated groundnuts. On the other hand the chillie crop (unirrigated) and onions

(irrigated) have responded well to all of these fertilizers, the yields being greatly increased and the fertilizers economic.

As regards the manuring of cotton an important discovery has been made at Surat by the Research Officer in charge of the Cotton Physiological Scheme financed by the Indian Central Cotton Committee. This is that the plant stands most in need of nitrogen towards the end of the monsoon.

At Karjat where the manuring of rice has been under investigation for some years it has been found that the nitrogenous fertilizer gives a better result if applied at the pre-flowering stage than at the tillering stage and that nitrogen can be applied with advantage at the flowering stage also.

The Indore method of preparing synthetic farm yard manure has attracted a good deal of attention, and accordingly steps have been taken to test this method at the Poona Agricultural College. The technical results obtained have been excellent, and now the economic aspect of this manure is receiving attention.

Agricultural Engineering.

Attention was drawn to the fact in last year's report that the improved seed-drill evolved by the Agricultural Engineer required to be lightened both in dead-weight and draught-weight. A new model was accordingly prepared, having a dead-weight of 350 lbs. and a draught of 140 lbs. This approximates to the draught of the country-drill (130 lbs.) at Mohol (Sholapur District) and the country-drill (141 lbs.) at Jalgaon (East Khandesh). It appears that a single model will not do for the whole of the Presidency and that different models will be required for particular tracts. Accordingly it has been arranged to concentrate on the Sholapur and Dharwar tracts for the present.

Some interesting figures have been obtained revealing the haphazard character of sowing done by a country-drill. These are tabulated in the following statement:—

Name of centre	Number of seeds dropped by a country-drill over a given distance		
	Coulters		
	First	Second	Third
Surat	310	195	..
Dharwar	528	300	400
Agricultural College	652	616	802

It will be observed that the seed sown by different coulters of the country-drill used at the Agricultural College has fluctuated to the extent of 30 per cent. while the difference has reached 76 per cent. at Dharwar.

These figures should be compared with those obtained by the Agricultural Engineer's drill at the same centres, as tabulated below :—

Name of centre	Number of seeds dropped by the Agricultural Engineer's drill over a given distance		
	Coulters		
	First	Second	Third
Surat	350	370	..
Dharwar	426	437	435
Agricultural College	993	947	934

The best results obtained with the Agricultural Engineer's drill have been at Mohol (Sholapur District). In the year under report these results were as follows :—

Name of Drill	Yield per acre in lbs.	
	Grain	Fodder
Country-drill	259	580
Agricultural Engineer's drill	334	827

On the other hand at the Agricultural College where the Agricultural Engineer's drill has proved too heavy, the Professor of Agriculture reports that, although the gaps in the crop sown by the Agricultural Engineer's drill were 14 per cent. less than in the crop sown by the country seed-drill, there was no marked difference between the yields.

As regards the new winnower referred to on page 51 of last year's report a modification has been devised for the purpose of reducing the power required as it was found to be rather too heavy for one man to operate continuously. The belt-drive

has accordingly been replaced by a chain-drive. The machine as modified was demonstrated in the Bhal tract of Ahmedabad District which grows a vast quantity of wheat. The results obtained substantially corroborated those obtained in Khandesh in the previous year, but the need for a winnower in this tract does not appear to be acute as there is good wind and apparently ample time for the country system of winnowing. It has accordingly been decided to direct attention to the Dharwar District where wheat-winnowing is required to be done quickly in order to complete the work before the arrival of the ante-monsoon showers.

Work is in progress upon designing a groundnut digger. Digging out groundnuts from the soil is a great labour absorbing operation in our principal groundnut tracts. The design is modelled on that of the rotary potato digger in common use in Western Countries.

There is a demand for a cheap machine which will crush fresh limes, on a large scale, and work is now in progress on this problem.

Further experience has been gained upon the defects of tractor design, considered from the standpoint of Indian conditions. Details of various improvements suggested by the Agricultural Engineer were recorded on pages 52 and 53 of last year's report. In the year under report it was found that the wheels of one of the new models were not well designed as a crack had developed at the boss, presumably because of the latest arrangement for tightening which consists of only one key on a taper shaft.

Fruit.

The total orchard area in the Presidency, excluding nuts and spices, is about 60,000 acres, and there is considerable scope for expansion. The Department is giving special attention to

Mangoes.	Bananas.
Guavas.	Bors.
Grapes.	Jambul.

The principal centre for this research is the Ganeshkhind Botanical Gardens, where varietal, cultural and manurial operations are in progress. The best methods of propagation are receiving special attention, and in this connection it may be mentioned that the budding system promises to replace the grafting system of propagation in mangoes. As regards varietal work the Basrai plantain is making rapid progress and there is a strong demand for " sets ".

The problem, however, which has been monopolizing the attention of the Horticultural Section is the export of fresh fruit with special reference to the mango. It seems remarkable that India has no share in the international overseas trade in fresh fruit which has developed so greatly in recent years. With the aid of a grant of Rs. 4,500 from the Imperial Council of Agricultural Research trial consignments of mangoes have been sent weekly to the London Market throughout the 1932 mango season. Most of this fruit reached its destination in good condition and sold at prices ranging up to 2 shillings with an average of 9 pence when fruits were shipped direct by sea. It appears that it will be possible to land a first class mango in London for six pence. Before this export trade can be put on a fully satisfactory basis, however, much careful research is required. With this object in view the research scheme referred to on page 27 *ante* has been planned.

Another form of research has also been undertaken by the Horticulturist to Government, and this is the economics of marketing fruit and vegetables in India. After making a careful study of the London and Paris markets Dr. Cheema has prepared a suggestive pamphlet for the consideration of the public. There seem to be great possibilities of improving the system of marketing.

CHAPTER IV.

AGRICULTURAL PROPAGANDA.

The principal subjects of propaganda undertaken during the course of the year pertain to

Land Development.	Cattle-breeding.
Improved Crops.	Fodder Conservation.
Cultural Methods.	Crop Pests.
Seed-grading.	Fruit Farming.

GREEN-MANURING.

Land Development.—As an example of this propaganda it may be pointed out that the officer in charge of this work in the Deccan gave a number of demonstrations in land development at Karad. These pertained to (1) contourbunding, (2) soaking compartments and (3) waste-weir construction. At Mandrup Show in Sholapur District he demonstrated (1) terracing, (2) the water-cushion method to stop erosion and (3) bund construction.

Improved Crops.—As regards improved crops these included selected varieties or strains of cotton, rice, sugarcane, jowar, bajri, groundnuts and tobacco ; the propaganda for improved rice strains in the Mallad and cotton and groundnuts in the Gadinad and Yerinad tracts of the Karnatak and of tobacco in Chikodi and Hukeri Talukas of Belgaum District was, for example, very intensive but this propaganda was undertaken all over the Presidency.

Cultural Methods.—The Department continued to demonstrate the Manjri System of sugarcane cultivation, as also the wider spacing of several crops like cotton and jowar. In the year under report a method of irrigating rabi crops, common in Sind (under the name of bosi-cultivation) but not known in the Presidency, was demonstrated at Pimpri on the Visapur Canal. The yield obtained was much in excess of that from the check plot.

The method of dry-farming advocated by the Department includes four important operations—(1) iron-ploughing, (2) use of small bunds (these are not to be confounded with embankments), (3) greater width between rows, and (4) intercultivation. The aggregate area of this demonstration was about 200 acres in Poona District and 150 acres in Ahmednagar District. In Ahmednagar District 25 large dry-farming demonstration plots were laid out on cultivators' fields, and the

yields obtained compared with those produced by the ordinary methods were striking, *vide* page 234 of this report.

Seed-grading.—The value of seed-grading (for jowar) in the East Deccan was vigorously demonstrated. Altogether some 4½ lakhs of lbs. of seed was graded with the help of the non-official agencies described below; this is sufficient for sowing about 60,000 acres. In the Karnatak also this work was pushed on, and 42 seed sieves were distributed in Gadag area in the year under report.

Cattle-breeding.—Propaganda on the keeping, breeding and rearing of better cattle and poultry was carried on in over 200 villages in the year under report, and shows and rallies were organized at the following places:—

Name of District.	Name of Place.	Cattle Show or Rally.
Dharwar	.. Devargudda	.. Show.
Belgaum	.. Yedur and Mandi	.. Do.
Sholapur	.. Mahud Bk.	.. Do.
Ahmedabad	.. Chharodi	.. Rally.
Do.	.. Govinda	.. Do.
Do.	.. Sanand	.. Do.
Do.	.. Dholka	.. Do.

The breeders are rapidly recognizing the benefits of the show-ring for competition purposes, whereas formerly a show was merely a gathering. In particular, the rallies held in Ahmedabad District were a great success as the breeders were enabled to compare their own cattle with the cattle of others and discuss their relative merits.

Fodder Conservation.—As pointed out in last year's report there is too little attention given by agriculturists to the feeding of their cattle. Insufficient fodder is produced in certain tracts owing to the large proportion of the land placed under money-crops, while too little care is taken to conserve the available fodder and make it go as far as possible. Apart from hay-making, where this is possible, the two principal methods of conserving available supplies are

Silage-making and Chaff-making.

The Department has been demonstrating silage-making at several of its institutions, in particular where these are located in the breeding zones; and it is satisfactory to record that silage-making is becoming adopted at several centres, such as Nedhrad in Ahmedabad District, Fattepur in West

Khandesh and Kordur in Dharwar District. Demonstration soils were also prepared at Peint in Nasik District. Similar demonstrations were organized at several centres in the Konkan.

Two power-chaff-cutters were demonstrated in Jalgaon and Erandol talukas of East Khandesh for about a month during the year under report, when 175,000 lbs. of chaffed fodder was prepared. The very low price of everything, including fodder, is rendering the demonstration of this valuable method of conserving the fodder supply, rather difficult.

Crop Pests.—With the aid of a grant from the Indian Central Cotton Committee an important piece of intensive propaganda was conducted in Broach District in connection with cotton bollworm destruction. An area of about 500 square miles, bounded on the south by the Nerbudda river and on the west by the sea and on the north by the Dadha river and on the east by the B. B. & C. I. Railway from Broach to Amod, was selected and an intensive campaign conducted to induce the people to remove all their cotton stubbles as soon after harvest as possible. A very fair measure of success was met with, and arrangements are being made to compare the bollworm population in this area with that in the neighbouring areas on the 1932-33 crop. Research has shown that the bollworm cannot be carried over from year to year without its food plant cotton, or certain other malvaceous plants which are rare in this tract and which were removed. The economic significance of this pest is very great as it destroys about 25 per cent. of the crop.

As regards treating jowar with sulphur dust and spraying and dusting crops this propaganda has merged into service and is dealt with under that section of this report.

Fruit Farming.—The Horticulturist to Government received 897 enquiries from the public during the year under report, which is an indication of the interest the public are taking in this branch of agriculture, a matter reflected in the rise of the orchard area to 59,414 acres in the year under report. Propaganda is carried out at the organized shows of the Department and through the medium of non-official agencies particularly Taluka Development Associations, some of whom maintain nurseries. Occasionally classes are organized for a week or so when instruction in improved methods of propagation and other items of management is given.

During the year 1,600 plants of mosambi—oranges and about 500 other fruit trees were supplied to selected persons in the

Anand and adjoining talukas of Kaira District with the object of promoting fruit-growing in the Charotar tract.

Green-manuring.—During the year under report the Department has carried out vigorous propaganda on the Deccan Canal areas to popularize green-manuring with sann. In order to facilitate this work Government has made water available at concession rates as explained on page 37 of last year's annual report. In this connection the Department issued 50,000 lbs. of sann seed free of cost on the Nira Right Bank Canal, sufficient to sow about 800 acres. On the Pravara, Godavari and Nira Left Bank Canals the Department has borne the cost of railway freight and other incidentals on sann seed supplied for demonstration purposes. On these canals 82,000 lbs. of sann seed has been distributed.

Similar work is in progress on the Girna Canal, and good results have been obtained with irrigated wheat so manured.

Green manuring is also being pushed in the Broach District, where 20,000 lbs. of sann seed was distributed.

Methods of Propaganda.

Apart from organized shows, the principal methods adopted for demonstration include (1) cultivators' fields, where improved crops, methods or implements are shown, (2) village threshing yards where threshing and winnowing and chaff-cutting machines are shown at work, (3) Revenue Department Jamabandi meetings and fairs where improved methods and seeds and implements are shown. In the year under report the district staff of the North Central Division managed 290 demonstration plots, and the complete programme of propaganda in this division is tabulated in the following statement to indicate the volume of work undertaken :—

Serial No.	Name of demonstration.	Number of places.	Attendances.
1	Crop demonstrations	66	1,434
2	Implement working	72	2,105
3	Power chaff-cutter	4	200
4	Jamabandi meetings and fairs	7	1,430
5	Cane-crushing and gul making	3	255
6	Sulphur treatment of jowar against smut ..	303	6,419
7	Tractor working	1	60

In the Deccan 257 demonstrations were arranged, in addition to three substantial shows. These shows were held at Karad in Satara District, Mandrup in Sholapur District and Shevgaon

in Ahmednagar district. The Mandrup show was attended by about 10,000 persons. The success of these shows is due mainly to the efforts of enthusiastic district officers like Mr. H. F. Knight, I.C.S., and Mr. S. K. Wodeyar, Prant Officer, and the support of non-officials like Khan Bahadur D. B. Cooper, Mr. R. N. Rajadnya, Mr. N. S. Boravke, and Mr. Annappa N. Kalyani.

In the Konkan there were held 110 demonstrations in addition to six substantial shows.

Non-official Propaganda Agencies.

Agricultural propaganda is the instrument for bringing home to the minds of the public the improvements which have been worked out by the Department through its research activities. It is not sufficient to produce a good variety of cotton; it must be made known and made available to the cotton-growers of the tract for which it is suitable. The propaganda staff of the Department is comparatively small, and for this reason, unable to come into direct contact with more than a small percentage of the agricultural masses. In these circumstances it is essential to organize non-official assistance. The principal non-official agencies which are undertaking agricultural propaganda are—

I—Taluka Agricultural Development Associations.
II—District Local Boards.
III—Co-operative Societies.
IV—Village School Masters.
V—Business firms.
VI—Individual Agriculturists.

There are five divisional boards of agriculture (recently reduced to four), one for each Deputy Director's Division, in this Presidency. These are composed of four non-officials and two officials (the Deputy Director of Agriculture and the Assistant Registrar of Co-operative Societies). These boards meet quarterly and review the propaganda work of the department and of the agencies mentioned above. Altogether, as shown in the margin, 70 resolutions of importance were submitted to the Joint Board of Agriculture (consisting of the Director of Agriculture and Registrar Co-operative Societies) for disposal, which held three meetings.

Name of the Divisional Board of Agriculture.	Number of resolutions submitted to the Joint Board for disposal.
Gujarat ..	7
North Central Division	11
South Central Division	13
Konkan ..	11
Karnatak ..	19
General ..	9
Total ..	70

Taluka Agricultural Development Associations.—These associations are of great assistance to the Department of Agriculture. Although the financial resources of most of them are small, they have the great advantage of operating within a comparatively small and definite piece of countryside so that they are essentially local bodies composed of the people and working for the people of the locality. Each association maintains, at least, one demonstrator who, if the right type of man, soon becomes well-known in his circle. These bodies accordingly receive every encouragement from the Department. The total number of these associations in the Presidency proper is 68, but, with one or two exceptions, no new associations have been registered for three years owing to the inability of Government to provide the subsidy (limited to Rs. 1,000 per annum to each association). These associations have been classified according to their efficiency and soundness as recorded in Appendix A. Within their small resources, many of these associations are doing very useful work. The most ambitious associations are to be found in Khandesh where a few have opened cattle-breeding farms of their own. Most of the Taluka Agricultural Development Associations in Khandesh are stocking fertilizers. In the year under report the quantity handled was 150 tons. The same associations earned over Rs. 3,000 in the hire of implements.

District Local Boards.—The Satara District Local Board continues to do excellent work for agriculture. It has undertaken to direct the activities of all the Taluka Agricultural Development Associations in the District, of which there are 10, and it contributed grants of Rs. 500 to each of these associations (The Satara and Karad associations received Rs. 1,500 and Rs. 1,000 each respectively during 1931-32). Other District Local Boards have assisted agricultural propaganda through allowing some of their staff to take a hand in introducing simple improvements.

Co-operative Societies.—It will be remembered that the Royal Commission on Agriculture in India made a strong recommendation that the Agricultural Department should make more use of Co-operative Credit Societies in their propaganda work. These Credit Societies are not in a position to undertake technical work but they can stock agricultural requisites like seed on the indent system and distribute the leaflets of the Department. In dealing with applications for loans for land improvement they put the applicants in

touch with the experts of the Department in this class of work by referring the schemes to the Department for examination and advice.

Examples of work done are tabulated below :—

District.	Name of the Co-operative Credit Society.	Work done in connection with agricultural improvements.	
		Demonstrations.	Extension of agricultural improvements.
1	2	3	4
(I) Poona ..	(1) Ravangaon ..	(1) Seed-grading .. (2) Treating jowar seed with sulphur dust. (3) New strains of crops.	(1) 16 members got 11,850 lbs. of jowar and wheat seed graded. (2) 9 members used 6 packets of sulphur dust. (3) 16 members grew Pusa wheat and N. R. cotton.
	(2) Palasdeo ..	Demonstrations in seed grading, treatment of jowar seed with sulphur dust and dry-farming.	(1) One member used 5 packets of sulphur. (2) One member grew Spanish peanuts. (3) One member sowed 10 acres of jowar according to the dry-farming method. (4) 6 members got 1,240 lbs. of jowar seed graded and 100 lbs. of wheat seed graded.
	(3) Sakurde ..	(1) Seed-grading .. (2) Treatment of crops against plant and insect diseases.	(1) One member got 500 Santra plants treated against aphis. (2) One member got 150 fig trees treated against rust disease. (3) One member treated 60 lbs. of jowar seed against kani. (4) 23 members got 1,810 lbs. of bajri seed graded.
(II) Ahmednagar.	(1) Hatgaon ..	(1) Growing of jowar by dry-farming method.	One set of dry-farming implements was prepared for each of these societies for popularizing this method of cultivation.
	(2) Rui Chatisi ..	(2) Jowar cultivation with graded seed.	
	(3) Rui Divta ..	(3) Akola bajri ..	480 lbs. of Akola bajri seed were distributed amongst the members of the Co-operative Society at Rui-Divta.

District.	Name of the Co-operative Credit Society.	Work done in connection with agricultural improvements.	
		Demonstrations.	Extension of agricultural improvements.
1	2	3	4
(III) Sholapur ..	(1) Tembhurni .. (2) Akola .. (3) Kasegaon ..	(1) Demonstration of seed-grading and dry-farming. (2) Introduction of new varieties of crops e.g. Nadiad tobacco, Pusa wheat, etc.	(1) 200 acres of land belonging to members were cultivated by the dry-farming method. Seven acres were sown with Nadiad variety of tobacco and 3 acres were put under Pusa wheat. Five members had manure pits dug and filled in according to approved methods. (2) 300 acres were sown with graded and sulphur-dusted jowar seed. Five acres were put under Pusa wheat, three manure pits were dug and filled in according to approved methods. (3) Nil.
(IV) Satara ..	Walwa, Koregaon, Karad, Khanapur, Satara, Khatav and Tasgaon have several Societies affiliated to Associations and the demonstration work, e.g., (*a*) seed-grading, (*b*) distribution of (*i*) sieves, and (*ii*) sulphur packets; (*c*) hire of ploughs amongst members etc. is conducted through the members of the Credit Societies.		
(V) Canal Area ..	(1) Belwadi .. (2) Kambleshwar .. (3) Wagaj .. (4) Sangvi .. (5) Lasurna ..	Demonstration of Manjri Method of cane-cultivation amongst heavily indebted members.	Plots of cane were arranged and supervised to convince members that the Manjri Method, at less cost, gives better yields. Four plots were arranged at Kambleshwar, two at Wagaj, one at Sangvi; and one at Lasurna.

The Non-Credit Co-operative Societies, such as the Sale Societies and Unions, are a still more effective agency for agricultural propaganda, because they handle agricultural produce and deal in requisites. For example the Gadag and Hubli Cotton-Sale Societies supply cotton-seed of improved varieties for over a lakh of acres each. These Non-Credit Societies take many forms; thus in addition to those that concentrate on the sale of produce and the supply of requisites, there are others that deal with such activities as co-operative fencing

and co-operative cattle-breeding and the protection of crops; and the Department takes the opportunity to advertise its improved seeds and methods, etc., through such Societies.

Village School-Masters.—In connection with the Mass Propaganda Scheme reported on page 32 of the report for 1929-30 which was also continued in the year under report, the District Local Board, Ahmednagar, permitted 28 teachers to help the Department for demonstrating the agricultural improvements embodied in the scheme. In the year under report there were about 800 acres under the improved methods in this District, and 30 demonstrations were held by the Departmental Staff and about 100 meetings were arranged by the school teachers. These were attended by 4,000 cultivators. The results obtained are tabulated in the following statement.

Treatment.	Yield per acre.		Increase per cent.	
	Grain.	Fodder.	Grain.	Fodder.
	lbs.	lbs.	lbs.	lbs.
(1) Dry-farming method	430	1,134	58	37
(2) Local method	272	825	..	..

Similar work was in progress in Barsi taluka of Sholapur District where 13 village teachers were associated with the scheme.

Work on these lines has also been started from this year in Poona District where ten village teachers were associated with agricultural propaganda.

Business Firms.—There are now several firms which supply such things as implements and fertilizers, and some have established their agents at mofussil centres and employ demonstrators. These firms usually take the advice of this Department upon the suitability of their wares, and in this way the Department is able to push its propaganda. In the year under report the Department continued to co-operate with Messrs. Burma-Shell and Company in popularizing tractor-ploughing in Dharwar District. To facilitate these activities arrangements were made to obtain takavi loans for those who got their lands ploughed; this money was paid direct to the firm on the certificate of the Department of Agriculture.

Individual Agriculturists.—Perhaps the best advertisement for an agricultural improvemets is a good agriculturist who adopts it on his farm. With this object in view the Department

organizes large numbers of demonstrations on cultivators fields and in villages with the co-operation of progressive individuals. The tabular statement given on page 46 *ante* indicates the scale of these operations.

Similar demonstrations were organized in other parts of the Presidency.

Under this category special attention should be directed to the work of past students of the Vernacular Agricultural Schools; for example it is reported that 130 past students of the Devihosur school are working on their own farms.

Rural Uplift Organizations.

In addition to the non-official agencies mentioned above reference should be made of the work which is being done by Rural Uplift Organizations. The Deccan Agricultural Association is the most important of these bodies. It has undertaken work at several centres including Khed-Shivapur, Thatavade and Dudhanwadi in Poona District. This association organized an important Uplift Conference in July under the Presidentship of His Highness the Rajasaheb of Sangli, which was attended by delegates from all over India. The technical agricultural propaganda of this association is carried out under the advice of and in close co-operation with this Department.

A village Uplift Committee has been organized in Sholapur District where six villages have been selected as centres of activity.

Perhaps, however, the best example of uplift work in the Presidency is the case of Kakhandaki village in Bijapur District. The special feature of this effort is that the momentum comes from the village itself and is not infused from without. An old inhabitant, Mr. Shivappa Arali, is devoting the whole of his life's savings, derived from farming, to this work, and the sum amounts to some Rs. 14,000 *plus* Rs. 4,000 accumulated interest. A committee of villagers has been appointed to administer the scheme under the close guidance of this Department. During the past year a detailed economic survey of 425 agricultural families was carried out, and four sub-committees were set-up to deal with—

(1) Land-development;
(2) Sanitation;
(3) Education; and
(4) Gardening.

Under Land-development special attention is being given to better tillage, and for this purpose a dozen iron ploughs have been purchased and 500 acres ploughed. Six embankment schemes have been prepared and these are being executed; an area of 70 acres of salt-infected land is being reclaimed. The Sanitation Sub-Committee is concentrating upon the purity of the drinking water and the provision of ordinary medicines; it is also dealing with the problem of storing manure in pits outside the village. The Education Sub-Committee in addition to giving every support to the existing agricultural-bias school, has opened a school for girls and recruited 40 pupils. The Garden Sub-Committee has opened a model garden where it has planted 200 mosambi orange trees, and it is rendering technical help to garden-owners in such matters as spraying, pruning and root-exposure. In addition the committee has secured a breeding bull.

Agricultural Magazines.

Periodical literature devoted to agricultural propaganda is published by three Agricultural Associations as tabulated below:—

Name of Associations.	Name of Magazine.	Language of Magazine.
The Broach Agricultural Association.	The Broach Industrial and Agricultural Quarterly.	Gujarati.
The Deccan Agricultural Association.	Shetki and Shetkari.	Marathi.
The Dharwar Agricultural Association.	Vakkaligaru Vakkalatanavu.	Kanarese.

The Broach Quarterly has an honorary editor in Mr. A. K. Vashi who has been discharging his duties enthusiastically and ably.

The staff of the Department supports these periodicals by contributing articles. Thus in the year under report the Konkan staff contributed 66 articles on agricultural subjects to the last two magazines mentioned above and to the magazine published in English by the Agricultural College.

CHAPTER V.

AGRICULTURAL EDUCATION.

The Poona Agricultural College.

This Institution has been in existence for about a quarter of a century. In the early days the number of students was comparatively small, but since the War the number has gone up considerably resulting in about 100 admittances per annum. This was more than the staff could handle efficiently, and with the coming of retrenchment it has been found necessary to reconsider this question. After taking into account the present strength of the staff it was decided to limit the admittances to 50 per year. Much of the practical instruction, particularly that connected with Agriculture proper, has to be organized according to the "batch" system. The batch is the number of students that can be taught efficiently by one instructor, whether professor or demonstrator; and some experienced instructors hold that the size of a batch in agriculture proper should not exceed 10 students. Thus the number of students which should be admitted to the College is fixed automatically by (1) the number of instructors and (2) the size of the batch. The primary object of this College is to give a three-years course of instruction in agriculture, with the object of fitting a man for an agricultural career, not as a peasant, but as a farmer or farm manager operating on a substantial scale. The relatively highly educated agriculturist is still a rather rare man in the Bombay Presidency, and hitherto only a minority of the past students have entered private farming. An attempt was made a few years ago to trace the men who had passed out of this College and ascertain their careers, and the following statement tabulates the information obtained :

I.	In the Agricultural Department of Bombay (Imperial, Provincial and Subordinate grades)	194
II.	In private farming	68
III.	In private service connected with agriculture	30
IV.	In Agricultural Departments in other Provinces	36
V.	In Agricultural Departments in the Indian States	50

VI.	In Government service in Bombay Presidency other than in the Agricultural Department	7
VII.	In private services and businesses other than Agriculture	12
VIII.	In private business connected with agriculture	1
	Total ..	398

It will thus be seen that although the percentage of men who entered private farming was only 17, the percentage who secured jobs connected with agriculture was 95.

An important consideration bearing upon the number of candidates applying for admission to this College, is the fees. Formerly the fee was Rs. 60 per annum. The new scale of fees is—

Rs. 120 per annum for students belonging to the British Districts of the Bombay Presidency and to Indian States in direct political relationship with the Government of Bombay.

„ 240 per annum for all other students.

These new fees have caused a falling-off in the number of applications for admittance, but the number in the year under report (June 1932) is still in excess of the accommodation. The following tabular statement summarizes the position on June 30th, i.e., 20 days after the opening of the new session.

Area.	Number of students		
	Who applied for admission.	Who were admitted.	Who were present on 30th June 1932.
1. From British Territory of Bombay Presidency..	53	29	27
2. From Indian States in the Bombay Presidency in political relations with the Government of Bombay	7	4	4
3. From Indian States in the Bombay Presidency not in Political relations with the Government of Bombay	14	10	6
4. From the States outside the Bombay Presidency	17	3	3
5. From other Provinces	9	4	4
Total ..	100	50	44

There are standing orders to limit the number of students admitted from outside the Presidency to 10 per cent. The marginally noted figures show the number of students who have graduated since 1921–22. In the year under report 82 candidates appeared for the ordinary degree in agriculture, B.Ag., and 58 were successful, giving a pass percentage of approximately 70. In addition, six candidates appeared for the diploma and all passed. The course for diploma students is the same as that for degree students, but the former are not eligible for the B.Ag. owing to some disability such as failure to fulfil some University condition.

Year.	Number of B.Ag.'s
1921-22 ..	44
1922-23 ..	38
1923-24 ..	55
1924-25 ..	59
1925-26 ..	25
1926-27 ..	27
1927-28 ..	38
1928-29 ..	60
1929-30 ..	61
1930-31 ..	53
1931-32 ..	58

The number of students doing post-graduate work at this College during the year under report was five. Two of these succeeded in obtaining the M.Ag. and one obtained the M.Sc. degree.

The Vernacular Agricultural School at Devihosur completed its eighteenth year when 16 out of 20 candidates obtained the school certificate : altogether there were 35 students on the roll. There were 92 applications for admission but, for reasons of accommodation, only 14 could be admitted. It is satisfactory to note that it has been found possible to reduce the scholarship ; thus six boys were admitted without any scholarship and eight received a Rs. 5 scholarship only. As regards the previous history of these 14 boys it may be pointed out that eight had passed the vernacular final examination in the agricultural bias section, and one in the ordinary section. The total number of students who have been turned out by this school with the certificate is 215, and it is very gratifying to note that 130 of these men are reported to have entered private farming. Many of them are doing excellent work.

The Vernacular Agricultural School at Dhulia is also doing good work. During the year there were 33 students on the roll of whom 19 were Marathas, 14 other backward classes and one Brahmin.

The Vernacular Agricultural School at Loni was closed, owing to retrenchment, in the year under report. In the course of its life of 22 years it turned out 357 boys and 51 teachers (in training for agricultural bias schools). This was the original

school of this type, and it has done much valuable pioneer work. When the financial crisis passes away, the promoters of vernacular agricultural education will be able to build on the experience of this school.

The officers of the Department continued to give assistance to the educational authorities in regard to the management of agricultural bias schools. Thus the district staff conducted many of the examinations, but it now seems to be necessary for District Local Boards to appoint their own examining staff as the work has greatly increased.

Another matter which seems to deserve consideration: and that is that this new type of education should be conducted on intensive lines by selecting localities favourable for the purpose and having a large number of schools giving this type of education concentrated therein.

Special Education.—Apart from the regular education provided at the Poona Agricultural College and the Vernacular Agricultural Schools at Dhulia and Devihosur the department organises classes for giving instruction in special subjects, such as horticulture and tractor driving. Recently the Professor of Agricultural Economics organized a special six-weeks course of instruction in "Farm Costings". This class was held at Malsiras in Sholapur District because a member of the professor's staff has been engaged there for the past 2½ years in conducting an economic investigation into farm costings, using 25 farms as the basis of the investigation. The volume of data previously collected provided excellent material for this instruction and each student, working independently, was required to work-up the material pertaining to two farms; in this way they were trained how to work out the costs, receipts and profits or losses of each crop and also how to calculate the family labour income and the farm business income for the farm considered as a unit. Some 30 students took advantage of this course.

CHAPTER VI.

FINANCE AND ADMINISTRATION.

FINANCE.

The expenditure of the Department in the year under report is compared with that of the previous year in the margin. The receipts of the Department fell from Rs. 2,22,374 in 1930–31 to Rs. 1,85,722 in the year under report owing to (1) the fall in prices and (2) the reduction of activities owing to retrenchment: there was also a reduction in demand for such articles as milk. The year has been marked by further retrenchment.

Year.	Amount in rupees.
1930-31	14,35,905
1931-32	12,91,444

In addition to the staff retrenched last year and reported on page 64 of last year's report the following additional staff has been retrenched.

Name of appointment or post.	Remarks.
The Agricultural Engineer to Government.	This post is being kept in abeyance.
The Deputy Director of Agriculture, Konkan.	Do.
The District Horticultural Officer	Abolished.
11 posts of graduate assistants	Do.
3 posts of non-graduate assistants	Do.
1 post of clerk	Do.
9 posts of mukadams	Do.
1 Mechanical Assistant	Do.
4 Fitters and Engine-Drivers	Do.

In addition to three agricultural schools retrenched in 1930–31, one more school, namely, Loni, has been closed in the year under report. It is unfortunate that the Konkan Division, as a Deputy Director's separate charge, has been abolished because the Konkan constitutes an agricultural tract sharply differentiated from the rest of the Presidency. The Kanara District has been added to the Southern Division and the Ratnagiri District to the South Central Division and the Thana and Kolaba Districts to the North Central Division. The loss of the post of Agricultural Engineer is a severe blow to the Department. The implements of India are very crude, and there can be no big advance in the sphere of

land-management until the ordinary agricultural operations like ploughing and sowing have been raised to a higher plain; and a similar remark applies to threshing and winnowing and preparing the produce for market. A good deal of spade work has been done but we have only touched the fringe of the problem. Better tillage is a fundamental improvement because the advantages of other types of improvement, like the adoption of improved varieties of cotton, cannot materialize in full so long as the land is inadequately tilled.

Notwithstanding the retrenchment axe, a vigorous programme of work has been carried out. In the sphere of research this has been rendered possible through the liberal grants which have been received from such bodies as the Indian Central Cotton Committee; the Imperial Council of Agricultural Research and the Sir Sassoon David Trustees.

Subsidies were received from the Indian Central Cotton Committee for the marginally noted schemes, amounting to Rs. 1,58,532; and the expenditure under this head in the year under report was Rs. 1,38,493.

	Rs.	
(1)	32,176	for the Cotton Physiological Research Scheme at Surat.
(2)	26,205	for the Earias Bollworm Propaganda Scheme at Broach.
(3)	4,548	for the Boll-worm Clean-Up scheme in Gujarat.
(4)	23,599	for the Cotton-Wilt Research Scheme at Dharwar.
(5)	5,391	for part cost of the Khandesh Cotton-Breeding scheme at Dhulia.
(6)	6,958	for the Surat Cotton-Seed Distribution Scheme.
(7)	7,538	for the Hubli Cotton-Seed Multiplication Scheme.
(8)	6,952	for the Gadag Cotton-Seed Multiplication Scheme.
(9)	7,275	for the Gadag Supplementary Scheme for the distribution and extension of Gadag I cotton-seed.
(10)	36,592	for the Banilla Cotton-Seed Expansion Scheme in Khandesh.
(11)	1,298	for the Technological Assistant at Surat.
Total	1,58,532	

The following amounts were received during the year from the Sir Sassoon David Trustees :—

Rs.	
(1) 700	Further grant for the investigation in connection with the improvement of grazing lands.
(2) 5,200	Further grant for the investigation in connection with drought resisting crops, especially bajri.
(3) 3,100	Further grant for the investigation of the mango-blight problem.
(4) 3,000	Further grant for the testing of new nitrogenous artificial manures.
(5) 2,400	For castor research.

Rs.	
(6) 500	Further grant-in-aid to the Vernacular Agricultural School, Dhulia.
(7) 2,470	Further grant for the research work on wilt-diseases of sann hemp.
(8) 1,000	Further grant for vegetable research schemes.
(9) 425	For power chaff-cutter scheme.
18,795	Total

The following amounts were received from the Imperial Council of Agricultural Research in the year under report.

Scheme.	Amount in rupees.
Deccan Sugarcane Research Scheme ..	57,473
Large scale trial shipments of mangoes ..	4,000
Investigations into the vitamin contents of fruits through the Empire Marketing Board ..	500
Total ..	61,973

As regards the Personal Ledger Account which is used for financing agricultural requisites like seed and implements, the total amount advanced was Rs. 84,221, while the recoveries during the year were Rs. 88,568.

Administration.

Mr. T. F. Main continued to hold the post of the Director of Agriculture throughout the period under report.

Dr. Burns, Economic Botanist to Government and Principal, Agricultural College, Poona, was granted leave from 30th April 1932 to 28th October 1932, Rao Bahadur P. C. Patil acting as Principal and Mr. L. S. S. Kumar as Economic Botanist to Government during the period.

Several officers of the Department were on leave during part of the year, notably Dr. G. S. Cheema, Horticulturist to Government who returned from leave on 25th November 1931. Dr. Cheema spent this leave abroad, with the aid of a scholarship granted by the Empire Marketing Board for studying the marketing of fruits and vegetables. Rao Bahadur D. L. Sahasrabuddhe, Agricultural Chemist to Government, B.P., Poona, was on leave on average pay for 3 months from 1st April 1932 to 30th June 1932. Mr. V. N. Gokhale acted as Agricultural Chemist during the period and Mr. B. H. Patil acted as Assistant Professor of Chemistry from 10th June 1932

to 30th June 1932. Similarly, Mr. F. J. Master, Personal Assistant to the Director of Agriculture, was on sick leave for 2 months from 4th September 1931 to 3rd November 1931 and Mr. G. R. Ambekar acted as Personal Assistant during the period. Mr. N. V. Kanitkar, Soil Physicist, who was on leave for 8 months for study abroad, returned from leave on 1st August 1931. Rao Saheb B. P. Vagholkar, Deputy Director of Agriculture, S.C.D., was on leave for 4 months from 6th February 1932 to 5th June 1932, and Mr. V. V. Gadgil acted as Deputy Director of Agriculture, S.C.D., during the period. On return from leave Rao Saheb Vagholkar was appointed to the temporary post of the Agriculturist Officer, in charge, Sugarcane Research Scheme for the Deccan, and Mr. Gadgil continued to act as Deputy Director of Agriculture, South Central Division. I have to report with much regret that Mr. V. G. Patwardhan, Assistant Professor of Chemistry, Agricultural College, Poona, who was on medical leave for 4 months and 10 days from 1st August 1931, died on 10th December 1931. During this period of leave of Mr. Patwardhan, Mr. V. N. Gokhale acted as Assistant Professor of Chemistry.

Mr. S. H. Prayag, Cotton Breeder, Dhulia, and Mr. D. P. Mankad, Cotton Breeder, Viramgam, were also on short leave during the year under report.

Mr. W. M. Schutte, Agricultural Engineer to Government, proceeded on leave for 2 years, 1 month and 25 days from 20th September 1931 preparatory to retirement. Mr. H. P. Paranjpye, District Horticultural Officer, proceeded on leave prior to compulsory retirement, owing to the post being retrenched, for 2 years and 4 months from 1st March 1932. Mr. K. B. Naik, Divisional Superintendent of Agriculture, Northern Division, Ahmedabad, whose post has also been retrenched, also proceeded on leave prior to compulsory retirement from 7th August 1931.

Messrs. W. J. Jenkins, V. A. Tamhane, G. S. Kulkarni, N. V. Kanitkar, V. R. Dharwarkar and Rao Saheb B. P. Vagholkar were absent from their substantive appointments on deputation or otherwise during the year, and the following officers held the acting vacancies respectively.

1. Mr. C. S. Patel acted as Deputy Director of Agriculture, N.C.D., Nasik.
2. Mr. N. V. Kanitkar acted as Soil Physicist to Government, Manjri Farm.
3. Dr. B. N. Uppal acted as Plant Pathologist to Government, B.P., Poona.

4. Mr. V. G. Patwardhan acted as Assistant Professor of Chemistry up to 10th December 1931 and was then succeeded by Mr. V. N. Gokhale.

5. Mr. R. Y. Hulkoti acted as Cotton Superintendent, Southern Maratha Country.

6. Mr. G. P. Patil acted as Divisional Superintendent of Agriculture, Deccan Canals.

Mr. S. V. Shevade was transferred to the temporary post of Cotton Superintendent in the Banilla Scheme and Mr. V. C. Pavate was appointed as acting Inspector of Agricultural Schools in place of Mr. R. Y. Hulkoti appointed to act as Cotton Superintendent, S.M.C., Dharwar.

Mr. C. G. Paranjpye, Assistant to the Agricultural Engineer, acted as Agricultural Engineer from 20th September 1931, to 29th February 1932, that is, till the date from which the post of the Agricultural Engineer to Government was kept in abeyance.

In place of Mr. C. S. Patel, Cotton Superintendent, Gujarat, Surat, appointed to act as Deputy Director of Agriculture, N.C.D., Mr. T. V. Nagarsheth acted as Cotton Superintendent from 15th December 1931 to 1st April 1932 and Mr. G. P. Pathak from 2nd April 1932 onwards.

The appointment of a suitable man to the post of the Cotton Research Officer has not yet been filled.

The Department has lost, during the year under report, a very experienced officer in Rao Saheb D. H. Tagare, through superannuation. He served the Department for 36 years and was held in great esteem by all his officers and colleagues.

Publications.

The Department has published during the year under report the following memoirs, bulletins and leaflets :—

Memoirs (now published as Papers in the Indian Journal of Agricultural Science).

1. Paper entitled "The Work of the Bombay Cotton Breeders" by Dr. W. Burns.

2. Paper entitled "A Bio-Chemical Study of the formation of oil in Niger seed" by Rao Bahadur D. L. Sahasrabuddhe and Mr. N. P. Kale.

Bulletins.

1. Bulletin No. 166 of 1931—Bansi wheat of the Bombay Deccan and its improvement by Mr. B. Nazareth.

2. Bulletin No. 167 of 1931—Improvement of Manat lands in the North Konkan, by Messrs. V. G. Gokhale, and K. B. Modi.

LEAFLETS.

1. Leaflet No. 2 of 1931—Control of the Tambera disease of potato.
2. Leaflet No. 3 of 1931—Methods of field and orchard irrigation.
3. Leaflet No. 4 of 1931—Loranthus.
4. Leaflet No. 5 of 1931—Selection of a site for an orange orchard.
5. Leaflet No. 6 of 1931—Cultivation of Spanish Peanuts.
6. Leaflet No. 7 of 1931—Control of Citrus Gummosis.
7. Leaflet No. 8 of 1931—Grape diseases in the Bombay Presidency.
8. Leaflet No. 9 of 1931—Improved strains of Kolamba rice for the North Konkan.
9. Leaflet No. 10 of 1931—Sale of bull-calves.
10. Leaflet No. 11 of 1931—Procedure of getting samples analysed at the Laboratory of the Agricultural Chemist to Government, Poona.
11. Leaflet No. 1 of 1932—How to grow papaya.
12. Leaflet No. 2 of 1932—Bordeaux Mixture.
13. Leaflet No. 3 of 1932—Control of the Wilt disease in betel vines.
14. Leaflet No. 4 of 1932—Emergency fodders.

The following Papers have been published in foreign publications :—

(1) Paper entitled " Two new hosts of the Downy mildew of Sorghum in Bombay " by Dr. B. N. Uppal, Plant Pathologist to Government, Bombay, Poona.

(2) Paper entitled " The Basis for *Sclerospora Sorghi* as a species " by Wm. H. Weston Jr. and Dr. B. N. Uppal, Plant Pathologist to Government, Bombay, Poona.

(3) A short note on " Mutation in rice " by Mr. B. S. Kadam, Crop Botanist to Government, Bombay.

(4) A short note on " The relation of awn and glume colours in wheat " by Mr. B. S. Kadam, Crop Botanist to Government, Bombay.

T. F. MAIN,

Director of Agriculture,

Poona, 11th October 1932. Bombay Presidency.

APPENDIX A.

List of Taluka Agricultural Development Associations organized up to date.

According to the scheme laid down in Government Resolution No. 3378, dated 5th June 1922, Revenue Department, 68 Taluka Agricultural Development Associations were formed till last year (1930-31) as shown below :—

Division.	District.	No.
Gujarat	Surat	3
	Ahmedabad	1
	Kaira	2
North Central	East Khandesh	10
	West Khandesh	7
	Nasik	5
	Thana	2
	Kolaba	4
South Central	Poona	3
	Sholapur	2
	Satara	10
	Ratnagiri	4
Southern	Belgaum	4
	Bijapur	2
	Dharwar	7
	Kanara	2

No new associations were formed during the year under report (1931-32) as the formation of new associations is not, at present, encouraged owing to financial stringency. The Mahad Taluka Development Association that was formed in 1929-30, was the only association which was registered. This was on 1st October 1931.

Subsidies amounting to Rs. 39,248 were granted during the year under report (1931-32).

The associations have been classed by the Divisional Boards of Agriculture in order of merit as under :—

Class A.—The most successful or efficient.

Class B.—Struggling associations which deserve help if possible.

Class C.—Moribund associations.

Accordingly the number of associations in each class is as under :—

Division.	Class.		
	A	B	C
Gujarat	5	..	1
North Central	6	19	3
South Central	5	12	2
Southern	7	8	..
Total ..	23	39	6

During the year under reference the grant of subsidies to the following six moribund associations was discontinued according to Government orders :—

Name of Association.	Name of District.
Kalyan	Thana.
Ratnagiri	Ratnagiri.
Junnar	Poona.
South Daskroi	Ahmedabad.
Yaval	East Khandesh.
Edlabad	East Khandesh.

During the year under report (1931-32) Government granted lands free of assessment for building purposes to the following associations :—

(1) Malegaon.
(2) Chalisgaon.

APPENDIX B.

Summary of work done at the Poona Agricultural College for the Year 1931-32.

General.

The year under report is the 24th year of the life of the College as a separate institution. During the year the work of the Institution went on smoothly and successfully. Pandit Madan Mohan Malaviya, Vice, Chancellor, Benares Hindu University, the Nawab Saheb of Palanpur and the Director of Agriculture, Madras, were among some of the distinguished visitors who visited the College during the year.

Examination results, 1932.

Seventy-nine students appeared for the Intermediate Examination in Agriculture of the Bombay University. Out of these, 55 passed, the pass percentage being 69·6. No Diploma student was admitted to the I.Ag. class.

For the degree of Bachelor of Agriculture, 82 candidates appeared, of whom 58 passed in all subjects giving a pass percentage of 70·6. There were six Diploma students, all of whom passed. The 88 candidates had elected optional subjects as follows :—

Optional Subject.	Candidates appeared.	Candidates passed.
Intensive Study of Certain Crops—		
Rice	1	1
Cotton	6	4
Sugarcane	7	5
Advanced Plant Breeding	13	10
Advanced Agricultural Chemistry	9	9
Do. do. (For Diploma) ..	1	1
Advanced Animal Husbandry and Dairying ..	4	3
Do. do. do. (For Diploma) .	2	2
Advanced Agricultural Economics	24	17
Do. do. (For Diploma) ..	1	1
Advanced Horticulture	13	7
Do. do. (For Diploma)	2	2
Advanced Plant Pathology	5	2
Totals ..	88	64

In the subsidiary or part examination at the end of the second year in which candidates may sit for examination in the subjects of Agricultural Botany and Plant Pathology, 55 degree candidates appeared and 49 passed in both subjects and 6 passed in one subject. There were no Diploma students in this class.

There were 7 students in the short course (i.e. one year course), all of whom passed.

The number of students doing post-graduate work at the College during the year was five. Two students passed M.Ag. and one M.Sc.

Miss Kausalya, Professor of Natural Science, Queen Mary's College, Madras, worked in the Plant Pathology Section during June and July 1931.

Admissions, 1932-33.

On account of retrenchment both in Staff and budget it has been found necessary to restrict the admissions to the I.Ag. class and only 50 students were admitted. The short course class is temporarily suspended.

The numbers who applied for admission to the I.Ag. class, and who were actually admitted and who were present in the College on June 30, 1932 (i.e. 20 days after the beginning of the College Session) are given below :—

Provinces.	Class.	Applied.	Admitted.	Present on June 30.
Bombay Presidency and its States and Sind.	Degree ..	74	45	39
Other parts of India ..	Degree ..	26	5	5
	Totals ..	100	50	44

Fees.

The tuition fees have been changed. Old students from Bombay Presidency who are in the Final year are being charged Rs. 80 per year, other students from Bombay Presidency (in the first and second year classes) Rs. 120 and all students from outside Rs. 240 per year.

Optional subjects elected by students in their final year in the year 1932-33 along with the figures of the previous two years are given below :—

	1930-31	1931-32	1932-33
Intensive Study of certain crops—			
Rice	2	..	..
Cotton	5	4	..
Sugarcane	7	7	4
Advanced Plant Breeding	12	13	13
Advanced Agricultural Chemistry	5	8	8
Do. do. (For Diploma) ..	1	1	..
Advanced Animal Husbandry and Dairying ..	2	2	6
Do. do. (For Diploma) ..	1	1	..
Advanced Agricultural Economics	19	21	6
Do. do. (For Diploma) ..	..	1	..
Advanced Horticulture	12	10	15
Do. do. (For Diploma) ..	3	1	..
Advanced Plant Pathology	7	2	8
	76	71	60

The fall in the Agricultural Economics Section is probably due to the impending retirement of Rao Bahadur P. C. Patil while there is no announcement of his successor.

Athletics and Social Activities.

The U. T. C. platoon under the command of Lieut. K. S. Kulkarny was up to the strength and went into camp in the middle of December 1931. The platoon was successful in winning a number of sports prizes. Lt. K. S. Kulkarny was attached in October 1931 to the 1st (Marine) Battalion Bombay Pioneers for training.

The College Rover troop carried out its usual activities under Mr. A. A. Vasavada.

The College Gymkhana again carried on its activities under the able guidance of Dr. G. S. Cheema. During his absence on leave out of India, Mr. A. A. Vasavada looked after the affairs of the Gymkhana. Professor L. S. S. Kumar, a keen sportsman took an active interest in the Gymkhana Sports and games. There were no Inter-collegiate Sports in 1931-32 and hence the College athletics had no chance to compete with their fellows in other colleges.

The Director of Physical Training of the Bombay University held a training class in camp at Panchgani during October 1931 when two of our students attended the course in Physical training and passed.

The College Playing field was restored to its full original size ; it was prepared and laid out for various games during the year. The students have now the benefit of a large field where they can hold all their games and sports.

The Annual Social gathering held in August 1931 was a great success. Sir Chandrasekara V. Raman, the distinguished Scientist of India, was the chief guest of the day. There was a large and distinguished audience of visitors and the College hall was packed to its utmost capacity.

The Nusserwanji Sorabji Veterinary Hospital.

The number of in-patients treated during the year was 514 and the number of out-patients was 5,300. This institution continued to be of great use in the treatment of animals and also for instructions to the students of the College.

Library.

During the year 130 volumes were added to the Library. The total number of books in the library apart from periodicals is now 7,399.

Demonstration.

About the end of February 1932, Mr. J. L. Goheen of Sangli was kind enough to send his Rural propaganda Motor outfit for demonstration at the College. The outfit was demonstrated on 22nd February 1932 and gave the students an insight into the ways and means of the Rural Agricultural and other useful Propaganda. The slides and films on Agricultural subjects shown at night were instructive and interesting

Personnel.

The following in brief are some of the main changes during the year.

Dr. W. Burns, the Principal, went on leave from 30th April 1932. Rao Bahadur P. C. Patil took charge of the Principalship. Mr. L. S. S. Kumar, Assistant Professor of Botany, was appointed to act as Economic Botanist to Government, Poona. Rao Bahadur D. L. Sahasrabuddhe went on 3 months' leave from 1st April 1932. During his absence Mr. V. N. Gokhale acted as Professor. Mr. B. H. Patil acted as Assistant Professor of Chemistry from 10th to 30th June 1932.

The College and the Bombay University.

The College is well represented on the various branches of the Bombay University. During the year the University appointed a special committee to reorganise the course on Agriculture. The report of the Committee was considered by the Board of Studies in Agriculture and is now in a further stage of consideration by the University. It is hoped that the course will be passed in time to introduce it next June.

P. C. PATIL,
Acting Principal,
College of Agriculture, Poona.

College of Agriculture, Poona, July 11, 1932.

APPENDIX C.

Summary of Work done under the Deputy Director of Agriculture, North Central Division, Nasik, for the year 1931-32.

I—Staff.

I was in charge of the Division during the year. Mr. S. H. Prayag continued to work as Cotton Breeder except from 14th March 1932 to 9th April 1932, when he was on leave. Mr. N. V. Bhagwat worked as Inspector of Agriculture, Khandesh, except from 17th January 1932 to 16th May 1932 when he was on leave.

2. Mr. S. V. Shevde continued to work as Cotton Superintendent, under the Banilla Cotton Expansion Scheme. Mr. G. S. Moghe worked as Superintendent of the Patonda Farm under this Scheme till 1st October 1931, when he unfortunately died of cholera and Mr. D. M. Kulkarni, District Agricultural Overseer, Chandor, was transferred in his place.

3. Mr. N. L. Desai continued to work as Superintendent of the Jalgaon Farm. Mr. M. B. Ghatge, Graduate Assistant, under the Professor of Agriculture was transferred in this division; and posted as District Agricultural Overseer, Nasik, vice Mr. V. B. Parbhune who retired from 27th February 1932. Mr. J. N. Purandare worked as Bunding Officer and in addition was in charge of the Chandor section from 4th February 1932.

4. Owing to the abolition of the Konkan Division from 1st April 1932, the Thana and Kolaba Districts were transferred to this Division. Messrs. K. B. Modi and R. S. Dubhashi were in charge of North and South Thana sections while Mr. G. P. Jambhekar was in charge of the Kolaba District. Mr. M. R. Gokarn who was transferred from the Karwar District to this Division was placed as Inspector of Agriculture, for Thana and Kolaba. Mr. M. V. Gadkari was in charge of the Karjat Rice Research Station.

5. Mr. N. B. Limaye, Head Clerk in the office of the Deputy Director of Agriculture, North Central Division, was transferred to the Office of the Agricultural Engineer to Government, Bombay Presidency, Poona; and Mr. D. M. Thakar, Head Clerk in the office of the Deputy Director of Agriculture, Konkan, was transferred to this Division.

II—Season.

6. The monsoon broke in a little late in the third week of June and the Kharif sowings were mostly finished in the first week of July under good conditions. July and August were more or less continuously wet and this condition encouraged weed growth as it did not allow inter-culturing operations in time. There was a continuous break in the first half of September, which gave good opportunity to clear the fields. There were good opportune rains in the second half of September and the crop

conditions were very favourable. But there came exceptionally heavy rains in the first fortnight of October which adversely affected all the Kharif crops. The cotton and bajri crops were the most to suffer their yields being reduced to 4 to 6 annas. The groundnut crop lost all its foliage and the pods began to germinate.

7. As there were good rains in October the area under rabi crops was more than normal. The wheat crop in the Nasik District was normal while that in Khandesh was also good but was badly damaged by rats, which developed into a serious pest in some parts.

8. The irrigated crops of sugar, onions, wheat, etc., were normal. The grape crop in the Nasik District was badly affected by downy mildew and the growers had to use Bordeaux mixture very often causing great expenses.

9. *Plant pests and diseases.*—During the year, there was a serious trouble from rats mostly in Khandesh Districts. Arsenic poisoning was advocated for destruction of rats but it could save only small areas when it was intelligently used. Large areas of wheat, gram and linseed were destroyed in Sindkheda, Yawal, Raver, Amalner and Jalgaon talukas. In part of the Nasik District, the wheat crop was affected by rust, which reduced the yield to 9 to 10 annas. As said above the grape crop was badly attacked by downy mildew and about ten per cent. of the gardens were abandoned by the owners as they could not cope with the Bordeaux mixture spraying. Wingless grass-hoppers appeared in some villages in the Chandor Taluka ; but they were checked by heavy rains.

10. The prices of all agricultural produce ruled very low except groundnut, which fetched comparatively better prices. The labour rates have also gone down in rural areas ; but they are yet not so low as compared with the rates of agricultural produce.

III—Research and Experimental work.

11. *Banilla Cotton.*—As in the previous year comparative yield trials of Banilla and some promising strains of roseum were done in one guntha strips (size 180′ × 6′) according to Fisher's method of randomisation in five replications. Though the yield results were in favour of N.R., Banilla out-distanced it in money value. The following were the results obtained :—

Variety.	Average yield per guntha.	Average yield per acre.	Ginning percentage.	Average lint out-turn per acre.
	Lbs.	Lbs.		
Banilla	9·1	364	38·0	138·3
Farm N.R.	10·6	424	35·0	148·4

12. When compared in money value the results stand as under :—

Variety.	Average lint out-turn per acre.	Value per bale of 392 lbs.	Value of lint per acre.	Difference over N.R.
	Lbs.	Rs.	Rs. a. p.	Rs.
Banilla	138·3	83	29 3 0	1
Farm N.R.	148·4	75	28 3 0	....

13. As there is a general complaint in the districts that Banilla yields less than N.R. arrangements were made to carry out comparative trials of Banilla with N.R. on a large scale on five guntha plots in eight replications according to Fisher's method. For this purpose an area of 8 acres was rented near the Dhulia farm and the trials were laid out on it. The mean yields per five guntha plot of Banilla and N.R. were 12·9 lbs. and 21·9 lbs. respectively. As the season was very unfavourable to the cotton crop these results could not be depended upon and the experiments will be continued again in the coming season.

14. *Selections in neglectums.*—Among the promising roseum strains that were studied N.R. 6 maintained its high ginning percentage, viz. 40, besides giving good yield. N.R. 5 though a better ginner and wilt register has given low yield. Among the neglectums, malvensis 40 has given indications of high wilt-resistance with a ginning percentage of 36 and with staple $\frac{3}{4}''$ in length. This latter is not yet pure and requires further selection work.

15. *Selections in Bani.*—Study of different high grade bani cottons from the Nizam's Dominions continued. These show marked range of forms differing morphologically and in yield and earliness. Of these, the one which stands out prominently in point of quality of staple is Bani 3·8.

16. *Selections in comillas.*—Eight types have been isolated and purified. Some of these have shown marvellous morphological characters from crinkle dwarf mutants with full-sized bolls to tall vigorous plants with proportionately small-sized bolls.

17. *Selections for wilt resistance.*—With a view to isolate wilt resistant strains in the neglectum, bani and comilla cottons, a number of strains were grown on highly wilt infected land on the Jalgaon Farm. The strains that resisted wilt to a considerable extent were malvensis 40, verum 262, N.R. 5 and Berar 23.

18. Among the crosses, Dhulia 2 X comilla had reached F 5 generation. All these were transferred to the Jalgaon Farm ; but as they were from parents susceptible to wilt, they all succumbed very badly to wilt.

19. In addition, a search for wilt resistant plants was made in the districts from highly wilt infected patches and seed cotton from individual plants was collected for testing in the coming season.

20. *Cotton Breeding Scheme, Jalgaon.*—The Khandesh Cotton breeding scheme subsidised by the Indian Central Cotton Committee terminated on 31st March 1932 and a new scheme called "Cotton Breeding Scheme, Jalgaon," was launched from 1st April 1932. Its chief objects are as follows :—

(1) The isolation of cotton races homozygous for wilt resistance, i.e. cent. per cent. wilt resistant under standard conditions.

(2) The production of wilt resistant cotton races of good commercial value either by selection or hybridization.

(3) The rigid testing of desirable and promising strains before being certified suitable cottons for the tract.

(4) Investigation into the relationship of soil moisture and temperature conditions to wilt incidence.

(5) The study of the genetics of wilt resistance.

21. *Jalgaon Farm.*—The general cropping of the farm and the average yields of different crops obtained were as under :—

Name of crop.	Area.	Yield per acre.	Remarks.
	A. g.	Lbs.	
N.R. Cotton	19 34	105	All Kharif crops were ruined by heavy rains in October and the yields were far below normal.
Banilla cotton ..	81 32	165	
BXXI cotton ..	3 20	145	
Groundnut	23 32	834	
Jowar and Udid (mixed) ..	24 28	414 50	Rabi crops did fairly well though there was serious rat trouble.
Wheat	31 38	630	
Gram	3 1	711	
Corriander	1 20	422	

22. As there was sufficient moisture left in the fields after harvest of groundnut an area of about 16 acres was cropped with gram as a second crop after groundnut and the average yield obtained was 457 lbs. per acre.

23. *Cotton.*—As will be seen from the above statement Banilla cotton on an average yielded better than N.R. on the farm during the year. Probably Banilla suffered less than N.R. from the heavy and excessive rains of October. The farm cotton was sold by auction and Banilla realised Rs. 102-8-0 per *boja* of 392 lbs. as against Rs. 92 realised by N.R. The average ginning percentage of Banilla was 38·17 against 33·65 of the N.R.

24. *Wheat.*—Strains No. 224 and 168 were compared with the local Bansi. No. 224 yielded 682 lbs. of grain per acre as against 640 lbs. of Bansi. No. 168 yielded only 462 lbs. per acre. The last was badly damaged by rats.

25. *Deep* versus *shallow ploughing for wheat.*—In order to observe whether wheat crop can be benefitted by deep ploughing in hot weather by conserving more moisture an area of 3 acres was ploughed with a tractor and it was compared with another 3 acre plot treated ordinarily.

The results obtained were in favour of ordinarily treated plot; there being 713 lbs. of yield per acre in this plot as against 644 lbs. per acre in the deep ploughed plot. As there were very heavy rains in September and October, deep ploughing had no advantage over shallow ploughing, there being plenty of moisture in the soils at the time of sowing.

26. *Manurial experiments.*—A number of experiments are being carried on the farm on all crops, namely, cotton, jowar, groundnut and wheat. Owing to abnormal rains this year's results were vitiated. However, they will be given in the experimental report of the Division.

27. *Trial of new implements.*—The Agricultural Engineer sent a drill for trial for cotton and jowar sowing. It was tried on the farm and necessary improvements were suggested for making it more efficient. Similarly he sent a drill for trial for wheat sowing. As the coulters were found defective, it did not work properly and necessary changes were suggested to the Agricultural Engineer. Messrs. Cooper's "Baroda" and "Bijapur" ploughs were compared with BT 2 and Wiard No. 124 at their request and some modifications were suggested to make them more efficient.

28. *Seed distribution.*—The quantities of different seeds distributed from the farm during the year were as under :—

	Lbs.
N.R. Cotton seed	824
Banilla cotton seed	4,880
Groundnut pods	7,567
Jowar	567
Wheat	865
Gram	845
Corriander	32

29. *Implement Depôt.*—As usual the farm maintained the implement depôt and during the year ploughs and parts worth Rs. 457 were sold to the public. Besides, the Taluka Development Associations and cultivators were given necessary advice to procure suitable implements directly from different firms.

30. *Cattle Breeding Farm, Sangvi.*—This is the fifth year since the farm has been taken over from the Shirpur Taluka Association. There were several old cows and out-of-type animals which were weeded out during the year and the present herd consists of animals which are considered true to type. The strength of the herd as it stood on 31st March 1932 was as under :—

Cows	26
Female calves	15
Male calves	14
Breeding bulls	7
Work bullocks	7
	69

31. During the year two premium bulls were issued one each to Sakri and Dhulia Taluka Development Associations.

32. There were 18 casualties during the year of which two were killed by tigers.

33. As there was much in breeding the Live Stock Expert to Government, Bombay Presidency, Poona, supplied two Mhaswad Khilari bulls for service in the herd ; and it is hoped the progeny will be improved in the next generation.

34. For supplying green fodder in hot weather 71,000 lbs. of green fodder consisting of fodder jowar, maize and green grass was stored in a silo on the farm. Besides, arrangements are being made to grow green fodder by reclaiming land from the river side. Unfortunately the land allotted to the farm is very uneven and a large amount of money is to be spent in reclaiming it.

35. A private gentleman Mr. Fattesingrao Deshmukh of Ner in the Dhulia Taluka is maintaining a herd of about 60 cattle of Khillari type and Government have given him 150 acres of land for grazing. This gentleman is very enthusiastic in cattle breeding and he is also issuing breeding bulls in the district.

36. *Cattle Breeding farms of Taluka Development Associations.*—The Khillari cattle are popular in trans-Tapti area and in West Khandesh ; but in the eastern part of East Khandesh people like Nimari cattle and it is gratifying to record that the Jalgaon and Jamner Taluka Development Associations have started cattle breeding farms for Nimari cattle from pure stock imported from Nimar. Each of these Associations have purchased 20 pure Nimari cows and two bulls and they are doing well. The Department should support these enterprises by giving subsidies.

37. *Girna Canal plots.*—This is the second year of the experimental plot laid out at Agar on the Girna canal. Banilla cotton was sown on 5 acres in the last week of May, under irrigation. Though the season was not favourable the average yield came to 768 lbs. of kapas per acre. There was 4 acres under Spanish groundnut and it yielded at the rate of 1,593 lbs. per acre. Pusa 4 wheat gave a yield of 694 lbs. per acre. Cotton sown 18" apart gave 820 lbs. of seed cotton per acre as against 677 lbs. when sown 15" apart. Wider sowing has proved advantageous and is being demonstrated on the canal area. Akola bajri gave 1,019 lbs. per acre as against 766 lbs. of the local in the canal area.

38. *Green manuring for wheat.*—The common practice on the canal area is to grow wheat after bajri. These crops receive scanty manuring as it is scarce in the tract. So sann was tried as green manure before wheat at four places. The average out-turn of green manured plot was 942 lbs. as against 663 lbs. in the unmanured plot. Demonstration plots are being arranged on a large scale in the coming season in the area and cultivators are being advised to grow their own seed ; so that it can be available on the spot without any cost.

39. *Compound manuring for wheat.*—A mixture of castor cake, superphosphate and nitrate of soda at the rate of 150 lbs., 112 lbs. and 100 lbs. respectively was tried at six places and the average out-turn per acre was 948 lbs. as against 570 lbs. in the untreated plot. When the mixture was applied at half the above quantity, the yield obtained was 723 lbs. per acre.

40. *Ravalgaon Farm.*—Sheth Lalchand Hirachand of Sholapur has established a well equipped farm at Ravalgaon on the Girna canal and he is growing nearly 150 acres of cane. Besides he put in several varieties of fruit trees also. During the year he installed a factory for sugar making according to Hadi's process. This farm is serving as a very useful centre for demonstration and during the year parties of cultivators from Sakree, Shahada and Shirpur were taken to the farm.

41. Recently the water rates have been lowered by the Irrigation Department and it is gratifying to note that nearly 900 acres will be under sugarcane in the ensuing season. This figure was never reached before on this canal; but the lowering of water charges and other economic factors have combined to change the out-look.

IV—Organisations.

42. *Taluka Development Associations.*—There were 22 Associations during the year and they all did well with few exceptions. Appendix A gives their financial position and the activities carried on by them during the year.

43. As mentioned in paragraph 36 above the Jalgaon and Jamner Taluka Development Associations have started cattle breeding work from Nimari cattle. They each have procured about 20 cows and two bulls for the purpose. The Jamner Association is not yet registered but papers for registration are ready. The Bhusawal Association arranged a cattle show at Bhusawal which was opened by Mr. L. N. Brown, the Collector of East Khandesh. This Association has done pioneer work in cattle breeding by keeping premium bulls at several places in taluka. Several other associations have followed suit in this matter and are taking interest in cattle breeding by maintaining premium bulls.

44. *Non-credit Co-operation.*—The Fruit Sale Society at Waghoda in Raver Taluka did not do any direct trading as it was found difficult to procure reliable agents in the consuming centres. They are collecting market information from the principal consuming centres and it is being supplied to the growers. The Onion Sale Society at Kundewadi near Niphad did not do any business and will be wound up. The Nashirabad Crop Protection Society did good work as usual and protected an area of 9,621 acres at Rs. 0-5-0 per acre by engaging watchmen whose number varied from 17 to 28 according to needs at different times in the year. The Jalgaon Sale Society continued to do good work and the value of agricultural produce sold by it amounted to Rs. 1,64,242. It opened two branches at Amalner and Chalisgaon during the year.

V—*Propaganda.*

45. *Banilla cotton extension.*—The year was a great set back for this work. Due to abnormal rains in September and October the cotton crop practically failed in Khandesh, the average yield being about 80 lbs. of seed cotton per acre. Under the new scheme which came into operation during the year, 465 lbs. selfed seed was produced on the Dhulia farm; and this will be sown on the Bhadgaon seed farm in the coming season.

46. 93 acres of cotton on the Patonda farm yielded 14,289 lbs. of seed cotton giving 8,386 lbs. cotton seed, i.e. 153 lbs. and 90 lbs. of seed cotton and cotton seed per acre respectively. This is reserved for Bharwas village in the coming season.

47. The area under control for production of seed was 871 acres at Bharwas and 2,283 acres at 7 other centres. The total cotton seed obtained from this area was 136,490 lbs. which will cover nearly 6,000 acres in the coming season. The policy has been to restrict the controlled area in the wilt free zone; so the reserved area is less than in past years.

48. The site of the seed farm was shifted from Patonda to the old Bhadgaon farm where 208 acres of land has been taken on a lease of four years. The area has been ploughed with a tractor and is being made ready for the ensuing season.

49. Banilla cotton of the reserved area fetched a premium of Rs. 12 to 27 over local cotton and Rs. 12 to 439 over Oomra per candy of 784 lbs. The local rates for purified Banilla kapas ranged from Rs. 20 to 22 per maund of 164 lbs. as against Rs. 17 to 18 for local kapas.

50. During the year the ginning percentage of Banilla was 40 as against 34 of the local.

51. *Akola bajri*—This bajri is spreading rapidly in Khandesh and during the year nearly 30,000 lbs. of it was supplied to different Taluka Development Associations in the Division from Nasik.

52. *Wheat.*—Strains Nos. 162 and 168 are successful in Shahada and other trans-Tapti talukas of West Khandesh and during the year there were nearly 500 acres under these strains. Strain No. 224 which has done well on the Jalgaon farm was tried in the district; but due to rat trouble the trials were not successful. Strains Nos. 808 and 809 were tried in the Nasik District during the year and gave promising results. It is proposed to sow all these strains on the Jalgaon farm in the coming season and increase the supply of seed before they are put in the district.

53. *Sugarcane.*—J. 213 and Manjav are getting popular in the Sinnar, Kalvan and Malegaon talukas of the Nasik District and nearly 200 and 80 acres were under these canes respectively during the year. New varieties namely H.M. 10, Co. 290 and D. 109 were introduced during the year in the Nasik District for trials where existing varieties are not doing well.

54. *Manures.*—Most of the Taluka Development Associations are doing the work of stocking and selling fertilisers and during the year nearly 150 tons of fertilisers were handled by them.

55. *Poudrette manufacture.*—The Sinnar and Igatpuri municipalities undertook to prepare poudrette with the assistance of the Department. Some cultivators were induced to use it at Sinnar but unfortunately no cultivator came forward to use it at Igatpuri due to caste restrictions.

56. *Agricultural work in Dangs.*—The departmental Kamgar continued to work under the direct supervision of the Dang's Diwan. He got constructed 54 new embankments for rice lands and 248 old bunds were got repaired. At 38 places pits for storage of farm yard manure were got prepared. Improved nagli and rice varieties were demonstrated at five places. Besides he looked after the maintenance of the garden at Ahwa.

57. *Power chaff-cutter.*—Two power chaff-cutters were demonstrated for about a month in Jalgaon and Erandol talukas and they chaffed 25,000 bundles, weighing approximately 1,75,000 lbs. The hire charges recovered were Rs. 21-8-0. As the fodder was very cheap during the year people were not keen to spend money for chaffing.

58. *Tractor work.*—As there were no funds, the tractor was not let out on hire during the year ; but it was used for ploughing the new farm site at Bhadgaon where it ploughed 176 acres of land. The total number of hours worked was 321 in 40 days. The working cost came to Rs. 4 per acre exclusive of current repairs and depreciation.

59. *Implement Depôts.*—There were eight departmental depôts and hire charges on account of implements hired amounted to Rs. 870 during the year. Almost all Taluka Development Associations do the work of hiring the implements and during the year their total recoveries on this account amounted to more than Rs. 3,000.

60. *Crop protection measure.*—The Taluka Development Association at Raver engaged the services of two men for six months for doing pig-killing work and they killed 90 pigs during this period. The cost on account of pay and gun-powder amounting to Rs. 156 was borne by the association and village people assisted the work by giving food etc. free to the servants.

61. Rats proved a pest for the rabi crops in many talukas of East and West Khandesh. A special leaflet recommending the use of arsenic was got printed through District Agricultural Association of Jalgaon and it was widely distributed in the districts. All the Taluka Development Associations were requested to stock white arsenic and distribute it to the cultivators for rat killing and nearly 25 lbs.of arsenic was utilised for this purpose.

62. *Downy Mildew on grapes.*—There was a severe attack of downy mildew on grapes in the Nasik District and due to wet conditions in October and November its virulence was very severe. A special propaganda for spraying with Bordeaux mixture was carried on for two months

and the cultivators were persuaded to spray their gardens as often as possible against this disease. As a result of the propaganda a great part of the crop was saved and the people were convinced of the necessity of spraying against this disease.

63. *Propaganda against smut.*—Use of sulphur dust against jowar smut was demonstrated at 303 places and in all 6,733 sulphur packets were supplied to the cultivators. In Shahada Taluka a special propaganda was arranged for this work with the help of the local Taluka Development Association.

64. *Horticulture.*—The cultivation of fruit trees is extending in this division; so with a view to meet the demand for knowledge of the latest horticultural improvements a class was arranged at Dhulia. The class was conducted by Mr. H. P. Paranjpe for two weeks in the month of January. 42 students from the district attended the class and certificates were given to those who were successful in the final test examination.

65. The Horticultural Overseer prepared 75 grafts from the Borshya mango tree of which 33 were successful. Besides he did nursery work on Mr. Randive's estate at Dhulia where nearly a thousand trees of oranges, mozambiques, mangoes and lemons were budded and grafted.

66. *Silos.*—Demonstration silos were filled in the Peint Taluka of the Nasik District. Mr. Kane, the Mamlatdar of Peint took very keen interest in making these silos. The silos were made in Kachha pits and there were heavy rains in October and November; so much of the grass became mouldy. Arrangements will be made in the coming season to demonstrate them in a few selected localities.

67. *Demonstrations.*—The district staff managed 290 demonstration plots to demonstrate the use of various fertilisers, wider sowing, and varietal comparisons of bajri, wheat, cotton and sugarcane. Besides, magic lantern shows, working of implements, sulphur treatment of jowar against smut, Bordeaux mixture spraying against downy mildew on grapes etc. were demonstrated and the following statement gives an idea of the various activities carried on during the year :—

Serial No.	Nature of Demonstration.	No. of places.	Attendance
1	Crop demonstrations	66	1,434
2	Implements working	72	2,105
3	Power chaff-cutter	4	200
4	Jamabandi meeting and fairs	7	1,430
5	Cane crushing and gul making	3	255
6	Sulphur treatment of jowar against smut ..	303	6,419
7	Tractor working	1	60

68. *Field embankments.*—The Bunding Officer investigated 35 sites and prepared schemes for those. Unfortunately the works in almost all places were not completed for want of funds with the people. There is

no necessity of a separate officer for this work and from the ensuing year only genuine cases will be undertaken.

VI—Agricultural Education.

69. *The Vernacular Agricultural School at Dhulia.*—The total number of students during the year was 33 of which 16 were in the first year and 17 in the second year. According to castes 19 were Marathas, 1 Brahmin and 14 other Backward Hindus.

70. The annual examination was conducted by Messrs. V. C. Pavate, the Inspector of Agricultural Schools and N. R. Yardi, Graduate Assistant to the Cotton Breeder, Jalgaon, and all the students in the first and second year came out successful.

71. In all 103 boys have completed their course at the school till this year. Of these 27 are doing private farming and 44 are absorbed by Taluka Development Associations and the Agricultural Department, 10 are working as teachers in the agricultural bias schools and the remaining are yet to find their work.

72. The Local Agricultural School Committee continued to manage the contributions collected for the boarding of the boys. During the year Rs. 2,710 were collected from the local bodies of the Division and from this the boys were given a monthly scholarship for their boarding expenses at the rate of Rs. 8 p.m. During the year the committee lost the valuable services of Rao Bahadur S. D. Garud and Rao Bahadur G. V. Dange by their deaths. They were enthusiastic members of the committee and their loss is irreparable. Mr. Baburao Ransing worked as President of the committee and his keen interest in the work of the committee is commendable.

VII—Publicity.

73. The staff continued to contribute articles on agricultural topics to the local press and to the "Shetaki and Shetakari" and the "Agricultural College Magazine". The Taluka Development Associations as usual published their reports and results of experiments for the information of the public.

VIII—Miscellaneous.

74. *Dhulia Cotton Market.*—The Dhulia Cotton Market which came into existence from 20th October 1930 completed its first official year on 31st August 1931 and during that year their total receipts amounted to Rs. 8,023-3-0. The total number of arrivals of carts during that year was 33,914. During the current year, i.e. from 1st September 1931 to 30th June 1932, the total number of arrivals of carts was 35,765 and the receipts from fees and licenses amounted to Rs. 6,175-13-0. As there was trade depression the committee reduced the fee on carts of seed cotton from 2 annas to 1½ anna during the current year. Mr. S. H. Prayag continued to work as Chairman of the committee during the year and he

deserves special credit for the successful working of the market. The Superintendent of the market settled 609 disputes while 19 disputes were settled by the Sub-Committee.

75. *Change in the charge of the Division.*—From 1st April 1932 the two districts of Thana and Kolaba have been added to this Division due to holding in abeyance of the post of the Deputy Director of Agriculture, Konkan, on account of retrenchment. To keep up continuity of records the report of the work done in these two districts will be written by Mr. V. V. Gadgil who was the Deputy Director of Agriculture there till 31st March 1932. From next year the report of work done in these districts will be included here.

C. S. PATEL,
Deputy Director of Agriculture,
North Central Division, Nasik.

Statement showing information about the Taluka Development Associations in the North Central Division (amounts collected and main items of expenditure), for the year 1931-32.

Name of Taluka Development Association.	Amount collected.	Government subsidy.	Amount spent				Other charges.	Number of plots arranged.	Number of demonstrations held.
			Establishment and office.	Implements etc.	Manures, seeds etc.	Demonstrations.			
Nasik District.									
Nasik ..	386	600	569	..	69	91	517	25	7
Malegaon ..	2,489	757	709	123	128	77	366	..	..
Satana ..	1,802	696	1,033	170	114	80	150	36	..
Yeola ..	1,425	723	789	182	..	22	654	..	..
Kadwa Canal ..	1,347	576	878	..	25	42	503	17	..
East Khandesh.									
Amalner ..	789	433	503	255	61	35	117	56	10
Bhusaval ..	1,619	1,000	1,768	..	..	71	573	18	..
Chalisgaon ..	2,278	1,000	1,132	365	..	115	695	40	20
Chopda ..	872	828	848	..	93	115	10	7	18
Edalabad ..	407	..	370	132	..	50	414	40	73
Erandol ..	865	862	961	..	103	59	236	10	10
Jalgaon ..	2,980	1,000	3,493	260	..	216	1,136	133	61
Pachora ..	1,486	1,000	1,500	..	..	229	287	40	12
Raver ..	1,738	1,000	2,040	..	209	216	592	68	53
Yawal ..	876	..	966	..	..	287	178	..	..
West Khandesh.									
Dhulia ..	2,964	1,000	1,344	115	129	55	1,521	30	45
Nandurbar ..	1,277	1,000	1,159	90	46	242	466	50	..
Shahada ..	534	688	923	..	134	41	409	132	33
Sindkheda ..	1,401	956	1,086	2	245	109	550	88	29
Shirpur ..	1,360	1,000	911	12	326	6	727	92	28
Taloda ..	644	601	648	79	113	93	489	43	20
Sakri ..	2,133	1,000	1,063	..	..	185	1,161	48	52

Programme of work under the Deputy Director of Agriculture, North Central Division, for the year 1932-33.

1. Supervision and guidance of the Taluka Development Associations in the Division.

2. Work on breeding of wilt resistant cotton suitable for Khandesh at Jalgaon.

3. Work on Jowar breeding.

4. Organisation of Banilla cotton seed supply.

5. Organisation of seed supply of improved rices in Konkan districts.

6. Investigations into the causes of decrease in protein contents of rice due to the application of sulphate of ammonia on rice crop and measures which can prevent it.

7. Propaganda in the Girna Canal area for pre-seasonal sowing of cotton and use of sann as green manure for wheat, sugarcane etc.

8. Propaganda against smut in jowar by using sulphur dust.

9. Propaganda against wingless grasshoppers.

10. Propaganda against downy mildew by Bordeaux mixture spraying for grapes.

11. Introduction of improved strains of wheat, namely 162, 168, 224, 808 and 809.

12. Demonstration of power chaff-cutter.

13. Silo demonstration in Peint Taluka.

14. Poudrette propaganda in Sinnar Taluka.

15. Demonstration plots on wider sowing of cotton and sugarcane. Varietal trials of Bajri, wheat etc.

16. Organisation of regulated markets wherever possible.

C. S. PATEL,
Deputy Director of Agriculture,
North Central Division, Nasik.

APPENDIX D.

Summary of Work done under the Deputy Director of Agriculture, South Central Division, Poona, for the year 1931-32.

Staff.

Rao Saheb B. P. Vagholkar was in charge of the Division till 6th February 1932 when he proceeded on four months' leave and subsequently resumed duty as Agriculturist Officer in charge of the Sugarcane Research Scheme in the Deccan. I took charge of the Division from Rao Saheb Vagholkar on 6th February 1932 in addition to the charge of the Konkan Division. Owing, however, to the abolition of the post of Deputy Director of Agriculture, Konkan Division, from 1st March 1932 as a measure for retrenchment, I continued to remain in charge of this Division. In view of the possible change of Officers, instead of by name, the Deputy Director of Agriculture, South Central Division, continues to be the nominee of Government to represent agriculture on the Local Advisory Committee of the G. I. P. Railway, Bombay. The Deputy Director of Agriculture, South Central Division, also continues to be a member of the Irrigation Conference.

The changes in the staff were as under :—

Mr. T. S. Swadi, Superintendent, Manjri Farm, proceeded on long leave in September 1931 and was subsequently transferred from this Division. Mr. N. B. Patwardhan, B.Ag., held charge of the Manjri Farm and Mr. P. V. Wagle (who was ultimately intended for work in Sugarcane Physiology Section in the Sugarcane Research Scheme) was transferred from Ratnagiri to work on the Manjri Farm. The period of Mr. R. D. Khandekar on deputation in Foreign Service under the Shikshan Prasarak Mandal, Rajapur, has been further extended till the end of September 1932; and Mr. P. S. Kulkarni, acting Graduate Assistant, continued on Manjri Farm. The Manjri Experimental Station was closed in June 1932 and the whole of the staff was absorbed at the new Sugarcane Research Station, Padegaon.

Mr. V. N. Apte, Superintendent, Gokak Farm in Southern Division, was transferred in December 1931 for work as Superintendent of the new Sugarcane Research Station at Padegaon.

On the continuance of the Loni School on a reduced scale for the past year, viz. 1931-32 for the 2nd year students only, the staff at the school was reduced and Mr. T. N. Chaugule, B.Ag., Head Master, was relieved from Loni School for District Work. Mr. Chaugule was trained in the bunding work under the Bunding Officer, South Central Division, and was posted for work on the Visapur Canals; he was however transferred in October 1931 in Southern Division to work as Head Master, Devi-Hosur Agricultural School. Owing to the closure of the Vernacular Agricultural School, Loni, Mr. S. S. Khot, the 2nd Graduate Assistant at this school, was also transferred in May 1932 for work under the Live Stock Expert.

Rao Saheb D. H. Tagare, Inspector of Agriculture, Sholapur, after meritorious service over 30 years retired in April 1932; and Mr. C. R. Gokhale, District Agricultural Overseer, Barsi, was appointed in his place. The post of Bunding Officer, South Central Division, having been retrenched from 1st April 1932 the incumbent, Mr. M. K. Shirole, was transferred to work as District Agricultural Overseer in Sholapur District, with Headquarters at Pandharpur (instead of at Barsi) utilizing most of his time for land development work.

Mr. R. B. Ghatge, B.Ag., District Agricultural Overseer, Ahmednagar, was on leave on medical certificate for seven months from October 1931; and Mr. Y. K. Kondvikar, B.Ag., acted for him.

Mr. G. R. Yadav, B.Ag., District Agricultural Overseer, Satara, was ordered to proceed on leave from 1st April 1932; in his place Mr. R. B. Shinde, B.Ag., District Agricultural Overseer, Godavari Canals, Kopergaon, was posted for work at Satara, Mr. P. S. Kulkarni, B.Ag., acting Graduate Assistant at the Manjri Farm, having been posted for work at Kopergaon in place of Mr. Shinde.

The work on the Pravara Canals suffered when Mr. B. G. Oka, B.Ag., from the Manjri Farm was posted in October 1931 relieving Mr. S. T. Sathe (Senior Non-Graduate Assistant) for work under the Professor of Agriculture at the College of Agriculture, Poona.

Mr. Peter Rahatar, L.M.E., Mechanical Assistant, South Central Division, was transferred on promotion on the establishment of the Agricultural Engineer to Government, to act as Boring Overseer in October 1931. He however reverted in March 1932 to his post of Mechanical Assistant.

With the redistribution of charges as a result of abolition of Konkan Division as a measure for retrenchment from 1st March 1932, Ratnagiri District with its Farm and District Propaganda staff has now been absorbed in this Division.

In the month of February 1932 the Imperial Sugar Technologist had visited the Deccan Canals and he was supplied with all the details of sugarcane cultivation. At his request the Deputy Director of Agriculture had taken a party of 8 cultivators of the Deccan Canals to United Provinces and Bihar to see the working of the Sugar Factories in the months of March and April 1932. The tour was arranged by the Sugar Technologist of the Imperial Council of Agricultural Research. This visit was very instructive and a very valuable data has been collected. During the last four months several queries were received about the sugar manufacture and it has become a business of this office to supply this information. A short account of this visit is given under the Heading "Propaganda". In addition to the work of this Division the Deputy Director had to look to all the preliminary work of the Sugarcane Research Station at Padegaon from October 1931 to 6th of June 1932.

Retrenchment.

As a measure for retrenchment, the Vernacular Agricultural School at Loni was closed from June 1932 and, the post of Bunding Officer,

South Central Division, along with the contingent grant for the Land Development work was also closed from 1st April 1932. The Pig Killing Establishment hitherto continued on a temporary basis for over seven years as a result of the recommendation of the Committee for protection of crops from wild animals, has now been disbanded from 1st March 1932.

Season.

The month of June was practically dry except in Maval where passing showers were received just sufficient to sow seed-bed area. Regular monsoon was started in the month of July 1931 when Kharif crops were sown. The crops progressed well till the middle of September when heavy showers were received which spoiled the fodder. The continuous rain in the month of October and November postponed the sowing of rabi crops and their germination was affected and the crop became gappy. The crop was stunted in growth. The total rainfall at Poona was 26·2" and at Junnar 46·3". In the Satara District good ante-monsoon showers were received which helped the preparation of land. The heavy and continuous rain of September and October spoiled the groundnut crop and had an adverse effect on wheat and other rabi crops. The total fall of rains at Satara was 51·5" and at Javali 88·7", at Patan 87·18" and at Khatav, Koregaon and Tasgaon had received only 25". In the Ahmednagar District the rains in August and September were advantageous to cotton and bajri. The late rains were also beneficial to jowar. The total fall at Nagar was 30·8 inches. In Sholapur District major portion of rain is generally received in September and October, but this year heavy showers were received from June till the middle of October and the rabi crops were affected by excess of moisture. Jowar was attacked by Sugary disease and Rhizoctonia. The total rainfall at Sholapur was 27" and at Sangola 18·8 inches. The fall of rain on the Deccan Canals was more than normal but not evenly distributed. On the Nira Left and Right Bank Canals the rains in Kharif season were below normal while on the Pravara and Godavari Canals, they were excessive and cotton crop was affected by wilt. During the year, the rainfall at Baramati was 27·6", at Malsiras 27·6", at Kopergaon 24·3" and at Belapur 41·3".

During the year under report there was abundant supply of fodder and the price was also very cheap. Full advantage of this fodder was taken by the cultivators of dry tract in ploughing their neglected lands. In the Ahmednagar District the hire charges of implement Societies went to Rs. 3,000 as against Rs. 733 of the year 1930-31. Not a single plough was left unutilised in any implement Depot or Society.

The effect of the season was visible in different crops of the four Districts. In Poona District Bajri, groundnut and fodder crops were fairly satisfactory while kharif Potatoes and Rabi Jowar and Wheat had hardly produced 7 annas crop. The rice crop in Maval was normal. In Satara District kharif crops were very poor while rabi crops valued from 8 to 10 annas. In Ahmednagar and Sholapur all the crops suffered from heavy rain and have given 8 to 9 annas crop. The yield of Sugarcane

was almost normal but the price of Gul had gone very low and hence there was no margin left in this cultivation.

The slump in the agricultural produce made the economic condition of cultivators very bad as they have lost all the credit with the Sawkars and Co-operative Societies. The following were the ruling prices of Agricultural commodities in South Central Division in the year under report :—

(1) Gul	..	Rs. 12 to 17 per Palla of 250 lbs.
(2) Seed Cotton	..	Rs. 35 to 50 per khandi of 500 lbs.
(3) Groundnut	..	Rs. 18 to 30 per khandi of 500 lbs.
(4) Bajri	..	45 lbs. per rupee.
(5) Jowar	..	50 lbs. per rupee.
(6) Wheat	..	25 lbs. per rupee.
(7) Rice	..	16 to 20 lbs. per rupee.

Lines of Work.

The work of this Division is summarised under the following heads :—

I. Research.
II. Propaganda.
III. Agricultural organization—
  (A) Taluka Development Association.
  (B) Non-Credit Societies.
IV. Agricultural service—
  (A) Engineering Advice and Assistance.
  (B) Pig Killing Campaigns.
  (C) Field Embankments.
V. Agricultural Education.
VI. Miscellaneous.

Section I.

Research.

Manjri Farm.—The season was characterised by high maximum temperature from April to end of June. Hence it was slightly abnormal when compared to the past two years. The average yield of Gul was 9,597 lbs. as against 10,544 lbs. in the previous year.

The Sugarcane Research Scheme for Deccan was sanctioned by the Imperial Council of Agricultural Research, Delhi, and as a result the Farm of this Scheme was started at Padegaon, District Satara, in which the whole of the Manjri Farm has been merged ; hence, this was the last year of the experimental work at Manjri Farm. The experiments which have shown so far interesting results are summarised below :—

Nitrogenous Top-dressing Reduction Series.—The three years' cycle of this experiment was completed last year and the results have been

summarised in last year's report. The yields obtained this year are tabulated below along with those of the previous years :—

Serial No.	Treatment.	Weight of cane per acre (average of four replicates).				
		1928-29.	1929-30.	1930-31.	1931-32.	Average.
		lbs.	lbs.	lbs.	lbs.	lbs.
1	Farm Yard Manure, 30 cart-loads + 75 lbs. N.	89,713	98,866	68,416	79,905	84,225
2	Farm Yard Manure, 30 cart-loads + 112½ lbs. N.	96,380	102,775	75,692	88,540	90,847
3	Farm Yard Manure, 30 cart-loads + 150 lbs. N.	101,051	100,457	83,350	87,615	95,618
		Weight of Gul per acre (average of four replicates).				
1	Farm Yard Manure, 30 cart-loads + 75 lbs. N.	11,277	12,683	8,797	9,983	10,672·5
2	Farm Yard Manure, 30 cart-loads + 112½ lbs. N.	11,649	13,035	9,474	10,516	11,168·5
3	Farm Yard Manure, 30 cart-loads + 150 lbs. N.	12,320	12,591	10,816	10,771	11,624·5

The experiment was conducted in replicates as per Fisher's method and inferences drawn from the three years' results as given in the last year's report hold good for the 4th year's results also as can be seen from the averages given in the above statement.

Farm Yard Manure, Reduction Series.—(Reduction of Farm Yard Manure quantities than 30 cart-loads).—The results of this experiment have been available for the last three years and the following statement shows the yields obtained :—

Serial No.	Treatment.	Weight of cane per acre (average of 4 replicates).			
		1929-30	1930-31	1931-32	Average of 3 years.
		lbs.	lbs.	lbs.	lbs.
1	Farm Yard Manure, 15 cart-loads + 150 lbs. N.	73,325	84,708	71,495	76,509
2	Farm Yard Manure, 20 cart-loads + 150 lbs. N.	82,798	84,053	74,446	80,432
3	Farm Yard Manure, 30 cart-loads + 150 lbs. N.	79,260	87,145	72,849	79,751
		Weight of Gul per acre (average of four replicates).			
1	Farm Yard Manure, 15 cart-loads + 150 lbs. N.	10,214	11,322	9,578	10,371
2	Farm Yard Manure, 20 cart-loads + 150 lbs. N.	11,286	11,691	9,943	10,973
3	Farm Yard Manure, 30 cart-loads + 150 lbs. N.	10,978	11,755	9,759	10,831

The object of the experiment was to see whether the dose of Farm Yard Manure in the cultivators' rotation and system of manuring could be still further reduced from 30 cart-loads to 20 or 15 cart-loads keeping the nitrogenous top-dressing of 150 lbs. N. constant. The three years' results as seen in the above statement are not statistically significant. However, some general conclusions like the following can be drawn :—

(1) An increase of 5 cart-loads over 15 cart-loads has given about 602 lbs. of more Gul per acre.

(2) But, a further increase of 10 cart-loads over 20 cart-loads has given almost an equal yield.

(3) This means that 20 cart-loads would be the most economic application of Farm Yard Manure.

These would require further corroboration for at least two to three cycles, without which these cannot be accepted as final.

Nitrogen Requirement Series in conjunction with varying doses of water on Pundia.—The plots in the experiment were San green manured.

The results obtained for three years have been summarised below :—

Serial No.	Treatment.	Weight of cane per acre (average of duplicates).			
		1929-30.	1930-31.	1931-32.	Average of 3 years.
	70 acre inches.	lbs.	lbs.	lbs.	lbs.
1	75 lbs. N.	65,277	68,655	53,442	62,458
2	150 lbs. N.	69,302	81,465	65,865	72,210
3	300 lbs. N.	75,630	83,409	74,866	77,968
	100 acre inches.				
1	75 lbs. N.	64,184	67,070	59,479	63,578
2	150 lbs. N.	72,419	73,013	71,191	72,208
3	300 lbs. N.	91,523	77,466	78,479	82,493
		Weight of Gul per acre (average of duplicates).			
	70 acre inches.				
1	75 lbs. N.	8,329	9,392	7,209	8,310
2	150 lbs. N.	9,439	10,544	8,768	9,584
3	300 lbs. N.	10,178	11,798	10,099	10,692
	100 acre inches.				
1	75 lbs. N.	8,706	9,169	8,313	8,729
2	150 lbs. N.	10,191	10,040	9,528	9,920
3	300 lbs. N.	12,587	10,569	10,624	11,260

The results have shown that the response given by excess of manure and the water has been proportionate to their applications, economic

consideration from point of greater net profit being the limiting factor in the case of manure and the judgment of application of quantity of canal irrigation in relation to rainfall and the consideration of damage to the very soil and soils surrounding it being the limiting factors in the case of water.

Spacing Experiment.—An experiment was conducted to see which of the varieties respond well to 5 feet and 4 feet method. The varieties tried were :—

1. H. M. 544.
2. H. M. 89.
3. Pundia.
4. E. K. 28.
5. Str. D. 109.
6. P. O. J. 2878.
7. Co. 290.
8. J. 213.

It has corroborated the previous observations about Pundia that 4 feet is the best method against 5 feet. As regards the other varieties, the following have shown better response with 4 feet than 5 feet. However, further corroboration is essential :—

E. K. 28.

P. O. J. 2878.

Co. 290.

Str. D. 109.

H. M. 89.

Selection of profitable varieties—Large scale varietal trials.—To the existing varieties tried last year, E. K. 28 was added for trial. The following statement summarises the yields obtained in 1931-32 :—

Name of variety.	Weight of cane per acre.	Weight of gul per acre.	Weight of gul in pallas.	Extraction per cent.	Brix.	Percentage of gul to cane.	Comparative value taking Pundia as 100 on gul basis.
	lbs.	lbs.					
Pundia ..	60,319	8,486	35·35	70·11	20·67	14·07	100·0
H. M. 89 ..	75,935	10,447	43·53	65·11	22·40	13·76	123·1
J. 213 ..	76,914	9,258	38·58	63·66	20·04	12·04	109·1
Str. D. 109 ..	73,332	8,728	36·37	68·19	19·19	11·90	102·8
E. K. 28 ..	61,556	8,285	34·53	67·17	21·70	13·46	97·63
P. O. J. 2878 ..	71,921	9,379	39·24	62·70	22·18	13·04	110·5

It will be seen from the above statement that, P. O. J. 2878 is showing signs of superiority this year too, when compared to last year. It has

given on an average 10 per cent. more yield over Pundia. Similarly varieties mentioned in last years report have also proved superior to Pundia this year.

As regards E. K. 28, even though the yield is equal to Pundia yet it is showing signs that even it will be favourite with the cane-growers for Gul-making from the point of extraction and less lodging.

New varieties and selection of canes from Coimbatore suitable for Deccan Tracts.

The selections that were received from Coimbatore were grown and the seed available was transferred to Padegaon Farm for further multiplication. Amongst these Co. 364, Co. 360, Co. 362 and Co. 358 are showing signs of superiority from the point of growth, sucrose percentage and earliness.

A second consignment of Coimbatore varieties numbering from Co. 400 to Co. 415 which was received in first week of February 1932, has been planted at Padegaon Farm, together with the old ones.

Sugarcane Breeding.—The seedlings of the crosses referred in last year's report have been further propagated and observations will be made regarding their behaviour as being either thin or thick.

Flowering in Pundia Cane Crop.—The weather conditions of this year were abnormal characterised by lower maximum temperatures in the first fortnight of October and the unusually heavy fall of rain early November, with consequent cloudy weather and high minimum temperatures; these conditions were found to induce flowering in the Pundia cane-crop on the Farm and also in the cultivators' fields round about.

Padegaon Farm.—The land for this Farm (Area, acres 104 and 10 gunthas) was taken possession of, from 1st October 1931, preliminary sub-soil survey work was done before the site was selected. The whole area was ploughed by a tractor plough and after a piece of land was prepared, all the work on varieties of cane was transferred to this Farm from Manjri Farm in January 1932, and for further propagation of the varieties, the varieties were planted in January. Together with the varieties a varietal experiment consisting of the varieties—

(1) P. O. J. 2878,
(2) E. K. 28,
(3) Str. D. 109,
(4) H. 109,
(5) Co. 290,
(6) J. 213,
(7) H. M. 89,
(8) Pundia,

has been laid down as per Fisher's method of randomization and the same have been planted in six replicates.

The main works executed till June were :—

(1) Cleaning and levelling of the land in the farm area.
(2) Fencing and construction of farm buildings.
(3) Purchase of power machinery.

After the harvest of the Manjri Farm crop, the whole staff together with old dead-stock, and machinery was transferred to Padegaon in June 1932. The Manjri Farm area has been leased out at Rs. 35 per acre.

Kopargaon Farm.—At this Farm the cultivation of cane is conducted on the following lines :—

(1) New cane varieties.
(2) Nitrogenous requirements to cane.
(3) Diversification in cane farming.
(4) Improved method of planting.
(5) Growing of Adsali cane.

(1) In the varietal experiments the following varieties were tried and their yields are given below :—

Plant Cane.

(Yields per acre.)

Name of variety.	Weight of cane.	Weight of juice.	Weight of Gul.	Extraction per cent. of juice.	Brix.	Per cent. of Gul to cane.	Number of days required for maturity.
	lbs.	lbs.	lbs.				M. D.
Stripped D. 109 ..	89,954	59,379	10,181	71·25	18·5	11·3	12 21
D. 109 ..	118,536	80,004	12,688	70·5	17·74	10·7	12 20
E.K. 28 ..	98,587	65,626	12,908	67·42	20·44	13·1	12 6
P.O.J. 2878 ..	94,112	61,123	11,555	65·62	20·62	12·25	12 6
Pundya ..	104,943	71,489	13,065	71·0	19·66	12·41	13 10

Ratoon.

(Yields per acre.)

Name of variety.	Weight of cane.	Weight of juice.	Weight of Gul.	Extraction per cent. of juice.	Brix.	Per cent. of Gul to cane.	Number of days required for maturity.
	lbs.	lbs.	lbs.				M. D.
D. 109 ..	67,022	41,652	7,403	65·6	18·24	11·0	11 19
H.M. 544 ..	58,571	35,356	6,101	63·08	18·15	10·4	10 7
H.M. 39 ..	36,509	21,239	5,180	60·43	20·33	11·51	11 22
J. 213 ..	75,611	41,950	7,090	56·98	19·97	10·1	11 25
Pundya ..	61,544	42,553	7,819	71·5	19·96	12·6	11 20

During this year some of the old varieties have been dropped and new varieties like Stripped D. 109 and P.O.J. 2878 have been added.

The ratoon crop of Pundya for the year 1930-31 was very bad, viz. 4,868 lbs. of Gul per acre, and in the current year the standing ratoon crop of Pundya is also very poor. Although the ratoon crop of Pundia has given better yield in 1931-32, the average of the last two years' results is very low. It may, therefore, be remarked that the land of Kopargaon Farm has become sick of Pundya. The ratoon of other varieties especially the E.K. and P.O.J. are most promising and may replace Pundya.

(2) *Requirement of Nitrogen to Cane.*—This experiment was conducted with 100, 150 and 200 lbs. of Nitrogen and the three years' results are tabulated below :—

Plant Cane.

Treatment.	Yields per acre of Plant cane, variety Pundya.		
	Gul weight, 1929-30.	Gul weight, 1930-31.	Gul weight, 1931-32.
	lbs.	lbs.	lbs.
100 lbs. N.	12,983	12,867	11,559
150 lbs. N.	13,837	12,532	12,874
200 lbs. N.	14,455	13,287	12,618

Ratoon.

Treatment.	Ratoon.		
	Gul weight, 1929-30.	Gul weight, 1930-31.	Gul weight, 1931-32.
	lbs.	lbs.	lbs.
100 lbs. N.	....	8,336	6,983
150 lbs. N.	....	10,280	6,621
200 lbs. N.	....	8,884	6,646

The results are in favour of 150 lbs. N. in the case of Plant cane and of 100 lbs. N. in the case of Ratoon cane.

(3) *Diversification in Cane Farming.*—The object of this experiment is to introduce such crops in sugarcane rotation as would bring more money to cultivators. Two series of five years' rotation are laid out as follows :—

——	I series.	II series.
1st year ..	Sann ..	Sann.
2nd year ..	Plant cane ..	Plant cane.
3rd year ..	Ratoon cane ..	Ratoon cane.
4th year ..	Bajri and gram ..	Cotton on ridges.
5th year ..	Tobacco ..	Bajri and gram.

The yields and money value of both the series are given below :—

Crop.	Series No. I.		
	Yield per acre.	Cost of cultivation.	Net profit or loss.
	lbs.	Rs. a. p.	Rs. a. p.
Sann	29,708	4 5 6	....
Plant cane	11,568	457 0 6	+234 10 0
Ratoon cane	5,838	308 11 6	+64 8 6
Bajri	Grain 1,070 Fodder 2,072	59 8 3	−18 11 6
Gram	772	35 11 9	−11 5 3
Tobacco	1,184	78 10 0	−19 6 9

Crop.	Series No. II.		
	Yield per acre.	Cost of cultivation.	Net profit or loss.
	lbs.	Rs. a. p.	Rs. a. p.
Sann	29,708	48 5 6	....
Plant cane	11,122	459 0 0	+205 11 0
Ratoon cane	6,442	308 11 6	+83 3 0
Cotton	544	62 0 6	−16 11 6
Bajri	Grain 816 Fodder 2,264	59 8 3	−25 0 0
Gram	840	35 11 9	−10 3 9

From the results the II series appears to be economical, but no definite conclusion can be drawn unless the cycle is completed.

(4) The trial of Improved Method (Modified Manjri System) versus Local Method of planting cane was tried at Kopargaon during the last three years and the results are given below :—

Treatment.	Weight of Gul per acre in 1929-30.	Weight of Gul per acre in 1930-31.	Weight of Gul per acre in 1931-32.	Average for three years.
Plant Cane.	lbs.	lbs.	lbs.	lbs.
Improved method	12,082	12,368	11,642	12,030
Local method	13,556	12,479	11,372	12,469
Ratoon Cane.				
Improved method	..	7,118	4,929	6,023
Local method	..	8,372	4,443	6,407

Although the weights appear to be nearly equal the real difference will be seen in the cost of cultivation of the two methods which is summarized below :—

Plant cane.	Average yield per acre, 1931-32.	Average cost of cultivation per acre.	Net profit or loss.	Ratoon cane.	Average yield per acre, 1931-32	Average cost of cultivation per acre.	Net profit or loss.
	lbs.	Rs. a. p.	Rs. a. p.		lbs.	Rs. a. p.	Rs. a. p.
Improved method.	11,642	505 6 0	+238 15 6	Improved method.	4,929	308 11 6	+5 12 6
Local method	11,372	737 9 0	+12 7 9	Local method.	4,413	409 3 9	+125 5 6

During 1931-32 the Local Method Plot has given less yield than the Improved Method Plot in spite of increased dose of top-dressing on account of lower brix obtained in the year which was general all over the canal tract. The brix of the Local Method Plot was lower as the crop was badly lodged and as it was heavily manured.

(5) *Adsali Cane.*—The planting of Adsali cane was started in 1930 and it was decided to conduct harvesting trials in each fortnight of October, November and December. On account of heavy rains, it was not possible to start harvesting in October and the results of harvest in November and December are given below :—

Yields of Adsali Crop.

Harvest in 1st fortnight of November.			Harvest in 2nd fortnight of November.		
Weight of cane per acre.	Weight of Gul.	Brix reading.	Weight of cane per acre.	Weight of Gul.	Brix.
lbs.	lbs.		lbs.	lbs.	
118,720	11,104	14·79	125,820	11,745	15

Harvest in 1st fortnight of December.			Harvest in 2nd fortnight of December.		
Weight of cane per acre.	Weight of Gul.	Brix.	Weight of cane per acre.	Weight of Gul.	Brix.
lbs.	lbs.		lbs.	lbs.	
135,168	12,912	14·75	123,185	12,478	15·72

It will be seen from the above statement that with the delay in harvesting the Gul weights have increased except in the last case in which in spite of an increase in the brix less yield is obtained on account of perhaps the increase in fibre percentage. So Gul to cane should be the deciding factor in the harvest of cane crop.

The brix readings are very low and hence the margin of profit depends upon the prevailing rate of Gul in November and December. During the year 1930-31 the rate of Gul was Rs. 15-11-9 per Palla of 250 lbs. and the Adsali crop sustained a loss of Rs. 199-5-11 per acre. During the year 1931-32 the rate of Gul was Rs. 17-6-6 per Palla and the crop realised a profit of Rs. 84-14-9.

(6) *Cotton.*—During the year under report the trial of Banilla versus N.R. Cotton was conducted and their average yield is given below :—

Name of the crop.	Yield per acre.	
	lbs.	
Banilla	563	Low yields are due to excessive rain.
N.R.	457	
B. XXI	514	

The samples were sent for inspection through the Cotton Breeder, Khandesh, and the remarks are given below :—

Banilla	Cotton dull white, affected by boll-worm to some extent, staple 15·16 m.m., ginning percentage 42·5.
N.R.	Cotton very dull and undeveloped, affected by boll-worm, staple 12·14 m.m., ginning percentage 36·0.
B. XXI	Cotton white, soft, slightly stained, staple 18·20, ginning percentage 40·0.

From the above data it seems that Banilla cotton has better scope on the Deccan Canals.

Mohol Plot.—There was an abnormal heavy rainfall from the middls of June to the end of December. The total fall during the year was 37 inches 25 cents as against 21 inches 6 cents of the last year. Cotton crop was completely damaged and had to be grubbed up. The Rabi Jowar covered 35 acres but it was seriously affected by Rhizoctonia Batatacola and Sugary disease and the average outturn of grain came to 308 lbs. per acre and 1,014 lbs. of fodder. The average yields of last year were 388 lbs. of grain and 935 lbs. of Kadbi per acre.

Dry Farming Method.—(*a*) The experiment of Harrowed versus Ploughed was conducted in three replications and the results are given below :—

	Average yield per acre.	
	Grain.	Fodder.
	lbs.	lbs.
(1) Harrowed	284	664
(2) Ploughed	291	960

The experiment was vitiated by Rhizoctonia still ploughing has confirmed its superiority.

(*b*) The intercultural experiments had no scope to show the effect of interculturing as there was no dirth of rain. As a result no intercultural plot has given more outturn.

	Outturn per acre.	
	Grain.	Kadbi.
	lbs.	lbs.
(1) Hoed	320	868
(2) Ploughed	332	826
(3) No interculture	390	832

(*c*) The efficiency of sulphur-dusting of Jowar seed for preventing smut was tested for the last three years and there was not a single earhead of smut on the Mohol Plot when the untreated crop of Cultivators' Jowar was full of smut.

(*d*) *Grading of Jowar Seed with Sieves.*—The experiment of Graded versus Ungraded seed was tried in replication but due to the abnormal rain and Fungus disease there was no difference in the yield although the germination of graded seed was higher.

(*e*) *Soil Erosion.*—The effect of bunding to prevent soil erosion was tested on this Farm and the results are given below :—

	Outturn per acre.	
	Grain.	Fodder.
	lbs.	lbs.
(1) Unwashed	287	702
(2) Washed	150	507

(*f*) The trials of Improved versus Local seed drill were conducted in five replications and the results clearly show the superiority of the former :—

	Improved seed drill.		Local seed drill.	
	Grain.	Fodder.	Grain.	Fodder.
	(per acre) lbs.	lbs.	(per acre) lbs.	lbs.
Average of five replications ..	336	743	256	605

Breeding of Jowar.—Two distinct types have been found out in the Maldandi variety of Jowar which occupies more than a million and half acres in Sholapur and Bijapur Districts. Six strains of fast growing

(long internodes) and two of slow growing (short internodes) have been selected. The former grows fast and attains early maturity by a fortnight. The short internode types are very slow in growth and do not produce earheads and they are generally called "Band". An experiment of long and short internode types was conducted with a check of ordinary Maldandi and the results are given below :—

Selection No.	Character.	Total number of plants.	Number of plants bearing earheads.	Per cent. of plants producing earheads to total number.
30·3	Short internodes ..	203	70	34·3
		219	43	19·6
35·1	Long internodes ..	217	132	61·0
		229	100	43·7
Maldandi check ..	Mixed	196	99	50·5
		227	90	39·6

This investigation is very important for shallow soils where moisture content does not last till the period of maturity of late strains.

Strain No. 47-3, which had given high yield last year, was further tried in five replications with the local Maldandi check and the average yields are noted below :—

	Yield per acre.	
	Grain.	Karbi.
	lbs.	lbs.
Strain No. 47-3	362	1,176
Maldandi check	306	963

This strain has given 18 per cent. higher yield.

Twenty-one selections have been made from Tambada Gota variety which is considered as drought resistant. Similarly eight strains have been selected from Dagadi variety out of which Nagar Dagadi No. 15 appears to be very promising.

The parasitic weed called Striga is a serious pest and takes a heavy toll in Jowar cultivation. During this year some resistant strains from Maldandi variety have been found and a Striga resistant variety called Bilichigan Jowar has been secured. This variety was grown at Temburni in a field infected with Striga and it was found that it did resist Striga weed. Further trials will be conducted at Temburni side by side with other strain.

Section II.

Propaganda.

The principal items of propaganda are given below :—

(*A*) *The Popularisation of the Treatment against Smut of Jowar.*—Since last year the treatment of sulphur-dust was advocated and the old method of pickling with copper sulphate was discontinued. The following packets were distributed during this year :—

Name of the District.	Number of packets distributed.
(1) Ahmednagar	500
(2) Sholapur	1,625
(3) Satara	422
(4) Poona	276
(5) Canal area	1,177
Total ..	4,000

Besides 141,330 lbs. of Jowar seed was actually treated with sulphur, which was sufficient for 20,000 acres. This treatment is so successful that the per cent. of smut in treated fields did not exceed 0·7.

(*B*) *Introduction of New Crops and Varieties*—(*i*) *Introduction of New Cane Varieties in the Canal Area.*—As mentioned on page 103 of the last year's report the trial of H.M. 544 and Pundya was conducted for seven years and on all the canals and the results tend to show that Pundya has given 284 lbs. of more yield of Gul than H.M. 544 both as a plant and ratoon cane. From this it may be remarked that the variety of H.M. 544 is getting deteriorated or the local Pundya has got optimum conditions for producing better yields.

Similarly J.213 was tried at Velapur on the Godavari Canals along with Pundya and the results are in favour of Pundya by 250 lbs. of Gul per acre.

During this year the variety of E.K. 28 was introduced in several places and it appears promising but as all the crop was utilised for seed for spreading this variety, comparative figures of yields are not available. This variety has now been grown over 30 acres on all the canals and the reliable results will be obtained next year.

A beginning has been made to introduce two new varieties of cane, viz. P.O.J. 2878 and Co. 290, which are considered most promising on the Belapur Company's estate. In fact this Company claims its present prosperous condition on E.K. 28, P.O.J. 2878 and Co. 290. During this year 48,000 sets of P.O.J. 2878 sufficient for 5 acres and 22,500 sets of Co. 290 sufficient for 2 acres have been supplied to the cultivators and their results will be watched.

(*ii*) *Introduction of Banilla Cotton.*—Since last 5 years a comparative trial of Banilla versus N.R. Cotton was conducted on the canals and the average yields of the last 5 years are given below :—

Year.	Yield of seed cotton per acre in lbs.	
	N.R.	Banilla.
1927–28	1,025	976
1928–29	1,316	1,025
1929–30	1,266	1,300
1930–31	1,198	1,303
1931–32	765	892
Average ..	1,114	1,099

The yield of Banilla cotton is higher during the last three years. It fetches Rs. 15 more per Khandi (lbs. 480) of lint and has got higher ginning percentage. Hence, it has been decided that all the canal area should be considered suitable for Banilla Cotton. During this season 2,000 lbs. of Banilla seed has been distributed on the canals.

In the dry tract of Sholapur Banilla was tried in three places and the average yields are tabulated below :—

	Yield per acre of seed cotton.
	Lbs.
(1) Banilla	353
(2) Local Cotton	250

Experiments of artificial manures, viz. Sulphate of Ammonia and Sodium Nitrate were tried on irrigated cotton on all the canals during the last 4 years and the average yield per acre of the 4 years' trial is given below :—

Treatment.	Yield in lbs. of seed cotton.
(In perennial block after sugarcane.)	
(1) 25 lbs. of N. from Sulphate of Ammonia ..	1,346
(2) 25 lbs. of N. from Nitrate of Soda	1,392
(3) Control	1,086
(In eight months block.)	
(4) 20 lbs. of N. from Sulphate of Ammonia *plus* 15 lbs. of N. from Oil-cake	738
(5) 20 lbs. of N. from Nitrate of Soda *plus* 15 lbs. of N. from Oil-cake	812
(6) Control	516

From the results it will be noted that the cotton crop responds well by artificial manures and Nitrate of Soda gives higher yields than Sulphate of Ammonia.

(*iii*) *Introduction of Groundnut.*—The introduction of Spanish Peanut is pushed as this variety is suitable for medium black and light soils. During this year 24,000 lbs. of this seed is distributed on the canals. The yield varies from 1,000 to 1,500 lbs. per acre according to the nature of soil. In the dry tract of Poona District Spanish peanut was tried and the yield varies from 1,040 lbs. to 1,536 lbs. This may be due to favourable rains this year. The Spanish Peanut was manured with Super phosphate at the rate of 200 lbs. per acre and the results of 2 years experiments are very encouraging as the yield was increased by 457 lbs. and 316 lbs. respectively over the check plot.

(*iv*) *Akola Bajri.*—The introduction of this Bajri is continued year after year in all the 4 districts of this Division as it yields from 25 to 40 per cent. more outturn than the local area. On account of cross fertilisation, the seed gets deteriorated and fresh seed is required to be imported every year. During the year 6,400 lbs. of this seed was distributed in this Division.

(*v*) *Wheat and Tobacco.*—Pusa No. 4 variety of wheat has now become one of the items of improvement as it gives higher yield both in the dry and irrigated tracts. It is fairly resistant to rust and its area is rapidly increasing on the canals and in the dry tract of Poona District. During the year 9,160 lbs. of Pusa No. 4 was distributed, Gandiu No. 6 variety of Tobacco was tried in Satara and Sholapur districts and it has given 20 per cent. more yield than the local variety.

(*C*) *Improvement in sugarcane cultivation on canals.*—The following improved methods have now been adopted on all the canals :—

(*a*) Planting on rows at 4 feet apart which gives 10 per cent. more yield than local method.

(*b*) Selected sets of 3 eye-buds of top portion gives 15 per cent. more yield.

(*c*) Reduction of sets (8,000 in the case of rich land and 10,000 for medium land).

(*d*) Reduction of top dressing dose of N. to 200 lbs. per acre. The Department advocates only 150 lbs. of N. which is more economical but the cultivators have reduced the dose of 300 lbs. to 200 lbs. of N.

(*e*) Interculturing with bullock hoe which reduces the cost of weeding and conserves moisture.

(*f*) Sann green manuring.

During this year vigorous propaganda of Sann green manuring was made as the irrigation Department has granted special concession of free water for Sann crop on the Nira Right Bank Canal. The Agricultural Department distributed 50,000 lbs. of Sann seed free of cost on this canal and the area of Sann must be about 800 acres on

the Nira Right Bank Canal. On Pravara, Godavari and Nira Left Bank Canals, the Agricultural Department has borne all the cost of Railway freight and other incidental charges on Sann and the seed was supplied at cost price to the cultivators. In all 132,000 lbs. of Sann has been distributed in this season.

The Green manuring with Sann is receiving special attention of cultivators as the yield of cane manure with Sann is higher by about 500 lbs. than F.Y.M. (25 carts). The outturn of Sann crop is also very satisfactory as it produces from 15,000 to 70,000 lbs. per acre (green weight) according to the nature of the soil. The most favourable condition for raising Sann crop is drizzling rain with occasional heavy showers during the period of its growth. On the Godavari canals addition of 5 to 10 cart-loads of F.Y.M. has doubled the outturn. Except Chopan (stiff black) and rocky soil, Sann thrives on any soil provided the rainfall is favourable.

(*D*) *Crop pest and diseases.*—The work mentioned in page 106 of last year's report was further continued. A campaign of preventing Tambera disease on Potatoes was undertaken in Purandar, Khed and Junnar Talukas and a large area under Potatoes was treated with lime sulphur dust. Similarly the treatments for Gumoses, rust on figs, Mildew on peas, Aphis on cabbage and other vegetables and spraying of Bordeux mixture on grapes were undertaken on a large scale.

(*E*) *Implement Depots.*—There are 26 implement Depots in this Division. Most of the implements have become very old but still people do take advantage of the same. During this year Rs. 1,471-12-9 are realised as hire of the implements as against Rs. 1,137 of last year.

(*F*) *Dry Farming.*—The method of dry farming recommended by the Department consists of 5 important items, viz. (1) Deep ploughing, (2) Small bunds, (3) Broad sowing with, (4) graded and dusted seeds and (5) Interculturing. This method was tried in Nagar, Poona and Sholapur Districts with great success. In Nagar District 50 sets of dry farming implements have been given for this work from the show fund and in Poona and Sholapur the work is conducted with Departmental sets. The area under this method is about 200 acres in Shirur and Indapur Talukas of the Poona District, about 150 acres in Nagar District and although the rainfall conditions were more favourable to ordinary local system, the dry farming has given 20 to 30 per cent. increased yield in Poona and Sholapur and about 50 per cent. increase in Nagar District.

Soaking compartments at Belvandi.—The experiments of soaking compartments are conducted, during the last 3 years at Belvandi, but due to the insufficient catchment area, all the thirteen compartments could not be flooded with rain water. Only five compartments on the right side were flooded and three on the left side. The yield of Jowar, varied from hundred and sixteen to three hundred pounds of grain per acre, and three hundred to five hundred pounds of fodder. The total rainfall received at Belvandi, was only 18 inches. The surrounding check plots on the cultivators field yielded 225 pounds of Jowar, and four hundred and fifty pounds of Kadbi.

Boshi-Cultivation (Sind Method of flooding) at Pimpri on the Visapur Tank.—This experiment was conducted according to the instructions of the Director of Agriculture, in which 6 inches of irrigation is to be given once before sowing. One acre of plot was selected for this purpose and it was bunded on all sides. Side by side, comparative plots of cultivators under local methods were arranged for comparison. The yield of the Sind method was 780 pounds of Jowar, and 1,200 pounds of fodder. While the yield of check-plot was 192 pounds of grain and 450 pounds of Kadbi.

(*G*) *Seed-grading.*—The importance of seed grading has now been brought to the notice of cultivators and they have realised its advantage by increasing the outturn by 10 to 15 per cent. This work has become one of the routine duty of the Agricultural Staff. During the year this work was done with the help of village teachers and Taluka Development Associations and the following quantity of seed was graded :—

In Sholapur District 326,997 lbs. of Jowar Seed was graded.

In Poona District 46,390 lbs. of Jowar Seed was graded.

In Poona District 7,110 lbs. of Bajri Seed was graded.

In Poona District 45,960 lbs. of Wheat Seed was graded.

In Nagar District 24,650 lbs. of Jowar Seed was graded.

In Satara District 49,244 lbs. of Jowar Seed was graded.

The area covered by this seed exceeds 60,000 acres.

(*H*) *Shows and Demonstrations.*—During this year 257 demonstrations and 3 big shows were held in this Division. These demonstrations consist of standing crops, Sulphur dusting, seed grading, working of implements Bunding, etc., which are very useful in convincing the cultivators. Demonstration of agricultural improvements through Co-operative Credit Societies was also continued. The details of the big shows held are given below.

(*a*) *Agricultural Show at Karad.*—A grand exhibition was held at Karad on the 1st and 2nd of November 1931, under the presidency of the Honourable Dewan Bahadur S. T. Kambli, the Minister of Agriculture. The exhibition was very successful and was attended by five thousand cultivators. The prize distribution was done by the President in which the Tasgaon Taluka Development Association secured 21 prizes, and the Wai Association got 14 prizes and 7 silver medals.

(*b*) *A Show at Mandrup.*—A large show was arranged at Mandrup in Sholapur District during this year. It was an imitation of the Presidency Agricultural Show, on a small scale. The agricultural activities in all the branches were demonstrated and lectures were arranged on various subjects. The show was opened by the Commissioner, Central Division. It was attended by all the leading cultivators of the District, numbering more than ten thousand. The success of the show was due to the untiring efforts of the Collector of Sholapur, Mr. H. F. Knight, I.C.S. Special feature of the show was the demonstration of systematic

plotting and bunding of fields, grading of seeds, use of improved seed drills, systematic interculturing, and improvement of mal lands.

(c) *Agricultural Show at Shevgaon.*—A show was held at Shevgaon (District Ahmednagar) at the time of the Shevgaon-Pathardi Taluka Co-operative conference in February 1932. At this show following sections were arranged :—

(1) Insecticides and the fungicide section.
(2) The fertiliser section.
(3) The Improved crops section.
(4) The publicity section.
(5) The land development section.
(6) The improved implement section.

Besides the Departmental Sections, there was a fertiliser section of the Imperial Chemical Industries, Bombay, with their fertilisers. In addition to lectures, practical demonstrations were also given. Several cultivators received the benefit of this show and it is expected that they will carry out in practice good many improvements demonstrated, particularly the dry farming method and land development which received special attention of the cultivators.

(*I*) *Demonstration of Agricultural Improvements through Credit Societies.*—As recommended by Royal Commission on Agriculture, in Chapter V, recommendation 29—" The Agricultural Department should make greater use of co-operative credit societies in their propaganda work "—the work has been attempted since 1929 as reported in previous year's report at some centres in this Division. The work done is summarised below :—

District.	Name of the Co-operative Credit Society.	Work done in connection with agricultural improvements.	
		Demonstrations.	Extension of agricultural improvement.
(1) Poona ..	(1) Ravangaon ..	(1) Gave demonstration in seed grading.	(1) 16 members got 11,850 lbs. of Jowar and Wheat seed sieved ; of this 5,900 lbs. were Wheat seed.
		(2) Treating Jowar Seed in Sulphur Dust.	(2) 9 members used 6 packets of sulphur dust.
		(3) New strains of crops.	(3) 16 members grew Pusa Wheat, N.R. Cotton.

District.	Name of the Co-operative Credit Society.	Work done in connection with agricultural improvements.	
		Demonstrations.	Extension of agricultural improvement.
(I) Poona—*contd.* ..	(2) Palasdeo ..	Gave demonstration in seed grading, treatment of seed of Jowar with Sulphur and dry farming.	(1) One member only used 5 packets of Sulphur. (2) One member grew Spanish Peanut groundnut 10 gunthas. (3) One member grew Jowar 10 acres, according to the dry farming method. (4) 6 members got graded 1,240 lbs. of Jowar seed and 100 lbs. of Wheat seed.
	(3) Sakurde ..	(1) Seed grading .. (2) Treatment of crops against plant and insect diseases.	(1) One member got 500 Santra plants treated against aphis. (2) One member got 150 fig trees treated against Rust disease. (3) Treatment of Jowar seed against Kani. One member treated 60 lbs. of seed. (4) 23 members got 1,810 lbs. of Bajri seed graded.
	(4) Khamgaon ..	....	....
	(5) Supa ..	....	....
(II) Ahmednagar ..	(1) Hatgaon ..	(1) Growing of Jowar by dry farming method.	One set of dry-farming implements was prepared and kept with each of these societies for use by members with a view to have this propaganda work a better momentum. 480 lbs. of Akola Bajri seed were distributed amongst the members of the Co-operative Society at Rui Divata.
	(2) Rui Chatisi ..	(2) Growing of Jowar with seed graded.	
	(3) Rui Divata ..	(3) Advantages of Akola Bajri.	

District.	Name of the Co-operative Credit Society.	Work done in connection with agricultural improvements.	
		Demonstrations.	Extension of agricultural improvement.
(III) Sholapur ..	(1) Tembhurni ..	Demonstration of seed grading and dry-farming.	200 acres of members were under dry-farming method; 7 acres under Nadiad variety of Tobacco and 3 acres under Pusa Wheat. Five members had manure pits dug and filled in.
	(2) Akola ..	Introduction of new varieties, e.g. Nadiad Tobacco, Pusa Wheat, etc.	300 acres under graded and Sulphur dusted Jowar; seed 5 acres under Pusa Wheat; 3 manure pits were dug and filled in.
	(3) Kasegaon ..	....	....
(IV) Satara ..	Walwa, Koregaon, Karad, Khanapur, Satara, Khatav and Tasgaon have several societies affiliated to associations and the demonstration work, e.g. (*a*) seed grading, (*b*) distribution of (i) sieves, (ii) sulphur dust packets, (*c*) hire of ploughs amongst members, etc. is conducted through the members of the credit societies.		
(V) Canal Area ..	(1) Belwadi ..	Demonstration of Manjri method of cane cultivation amongst heavily indebted members.	Plots of cane are arranged and supervised to convince members that Manjri method at less cost gives better yields. 4 plots were arranged at Kambleshwar; 2 at Wagaj; 1 at Sangvi and 1 at Lasurna.
	(2) Kambleshwar.		
	(3) Wagaj.		
	(4) Sangvi.		
	(5) Lasurna.		

(*J*) *Rural Uplift Work.*—In Poona District there are 3 centres, viz. (1) Khed Shivapur, (2) Thatavade and (3) Dudhanwadi where the rural uplift work is going on, under the auspicies of the Deccan Agricultural Association. The work is conducted in full co-operation with the Agricultural Department and the work of Agricultural improvement is entrusted to the Deputy Director of Agriculture and his staff. The main items of improvement consist of land development, introduction of Spanish Peanut, Akola Bajri, Pusa Wheat, Sann, graded seeds and popularisation of iron ploughs, use of sulphur to prevent smut, etc. Mr. G. K. Deodhar, the Chairman of the Deccan Agricultural

Association takes personal interest in all the lines of village uplift and has convened 2 successful conferences at Shivapur under the Presidentship of His Highness the Rajasaheb of Sangli. A village uplift committee has been formed for the Sholapur District under the Presidentship of the Collector of Sholapur. Six villages in the Sholapur taluka have been selected for this propaganda and a Bunding Society has been started at Mulegaon. The work of field embankments, grading and dusting of Jowar preserving manure in pits, etc. has been conducted in right earnest and the result will be watched with keen interest.

(*K*) *Agricultural Classes.*—During this year 55 short classes of 1 to 3 days were held on the Deccan Canals in which detailed lectures and practical instructions on various agricultural improvements are given. The attendance of such classes varied from 50 to 200 according to the importance of the class. A special class on irrigated crops was held at Malsiras for 10 days which was most successful. It was attended by 143 regular students and 150 visitors. The field of Mr. Govindrao Ganapatrao Pawar was selected for practical training. About 40 lectures were delivered in this class by experts of the Agricultural, Co-operative and Irrigation Departments and also by successful private farmers. A test examination was taken at the end of this class and 48 students (out of 50 appeared) came out successful. Prize distribution was done at the hands of the Executive Engineer, Malsiras, and 8 silver medals were distributed to the successful candidates at the top. Thanks of the Department are due to Messrs. R. N. Rajadnya and N. S. Boravke for offering 2 prizes and also to Mr. Babasaheb Patil and Mr. Govindrao Pawar for sparing their house and fields for this class.

The land development class held at Barsi has awakened the interest of cultivators to improve their lands.

(*L*) *Publications.*—During the year under report the following leaflets were completed :—

Serial No.	Name of leaflet.	English.	Marathi.
(1)	Leaflet No. 3 of 1931 on "Methods of Field and Orchard Irrigation"	1	1
(2)	Leaflet No. 6 of 1931 on "Cultivation of Spanish Peanuts"	1	1

The staff had contributed several articles to the Agricultural College Magazine, Shetki and Shetakari Magazine, Co-operative quarterly, Udyâna and many other papers.

(*M*) *Visit to United Provinces and Bihar.*—According to the instructions of the Director of Agriculture, Bombay Presidency, Poona, the Deputy Director visited United Provinces and Bihar to see the working of some

sugar factories with 8 cultivators of the Deccan Canals. The programme of the visit was arranged by the Imperial Sugar Technologist, Cawnpore. The party saw the Kanasari or open pan or bel process of manufacturing sugar with its latest improvements; the trials of Massy and I.C.A.R. mills, the sugar Refinery of Cawnpore, the Ganga Deshi Sugar Factory, Buxar, the Bihar Sugar Works at Pachruki, the Ledi Sugar Factory, the Punjab Sugar mills, Gugali and the Mahdeo Desai Sugar Factory and collected very valuable information. The Party was extremely pleased to note the minimum cost of growing cane in Bihar and U. P., viz., annas 5 per Bengal Maund and the high scope for the development of sugar industry. Since the protective duty is imposed on sugar, 21 new factories are under construction and all of them are confident to get the required supply of cane. In U. P. and Bihar the sugar factories are solely dependent on the cultivators for the supply of cane and this system is working wonderfully in that tract. The Railway Companies have also given special concession for the transport of cane from long distances. The average cost of manufacturing one Bengal maund of sugar in an up-to-date factory is about Rs. 6 while the sugar is sold at Rs. 10 to 11 per maund. On Deccan Canals the average cost of producing cane it annas 8 per maund. Only the Belapur Company has reduced this cost to annas 6½ due to the extensive cultivation with up-to-date machinery and introduction of new varieties like P. O. J. 2878 and F. K. 28 and Co. 290. Cultivators on the Deccan Canals can hardly continue to grow cane under the present low prices of Gul and they are now seriously thinking of starting small or medium size sugar factories. The data collected at Buxar and Ledi Factories will be very valuable for starting new factories in the Deccan. The Party is highly obliged to Mr. R. C. Shrivasatav for the information supplied by him and for the arrangement of visiting these factories where they were received with greatest hospitality.

(*N*) *Improvement of grass on mall land.*—During the year under report, the yield of grass on the plot at Barsi was 4,356 pounds per acre. The new plot at Mahud Budruk was much improved and the poor spear-grass had completely disappeared. The available grass had taken a firm root, and it is now protected with prickly-pear. Bone-meal at the rate of 1 Cwt. per acre was applied to one grass area and it increased the outturn by 66 per cent. The yield of the bone-meal plot was 5,445 pounds of grass, while the yield of the adjoining check plot 3,264 pounds. The following are the economics of Bonemeal on grass land :—

(1) It is an organic manure and will not do much harm even if the Rain-fall is not sufficient. (2) The cost of 1 Cwt. is Rs. 3-4-0 but if it is done locally it will not exceed Rs. 2 per Cwt. (3) It is gradually available and will not be washed away. Its effect can be seen in 2 or 3 years from the time of application. In the current year the yield of the check plot was 3,264 lbs. and that of the manured plot was 5,445 lbs. per acre, giving 2,181 lbs. of more grass which can be valued at Rs. 10. Thus, there is a clear profit of Rs. 6-12-0 per acre from the application of Bonemeal.

(O) *Tractor Ploughing.*—The demonstration of tractor ploughing done with the departmental tractor in the Madha and Sholapur Talukas during the year 1930-1931 had salutary effect. There are now 3 tractors in the Sholapur District, purchased during the year under report by the Manager of the old Mills at Barsi, Mr. Bankatlal Soni of Sholapur, and Mr. L. V. Tikekar of Tikekar Wadi. The first two land-lords plough their own lands with the Tractors, which are also utilized for pumping work. The third one is intended for hiring. These tractors have ploughed 200 acres during the year under report.

Mr. Tikekar, undertakes to plough the lands of cultivators at Rs. 10 per acre, and the plough penetrates at the depth of 8 inches. This tractor is now working in Akalkot State. The cost of working expenses comes to Rupees 5 Annas 6 per acre, which is corroborated by the trials of the Department, done last year.

The work of the Power Chaff Cutter is included in Section IV.

A brief summary of work done in each District and canal area.

(1) *Poona District.*—The work of Agricultural extension was carried out by (1) holding 28 implement and 11 crop demonstrations, (2) 4 Jamabandi meetings, (3) 20 lecture series and talks to the cultivators through the primary teachers with the permission of the Chairman of the School Board and Co-operative Societies. 10 villages were selected for introducing simple improvements through the teachers of the primary School. They have done excellent work of seed grading, pickling of jowar with Sulphur Dust, broad sowing of Jowar and impressing the cultivators with the advantages of interculturing of Jowar. The Ravangaon, Palasdeo and Sakorde Co-operative Societies have done active propaganda in seed grading, treatment of Jowar for Smut, dry farming and growing Pusa wheat, Akola Bajri, etc. The application of 200 lbs. of Nitrate of Soda for garlic and onions gave very good results by increasing the yield by 2,000 lbs. and 3,500 lbs. respectively. Similarly the application of 200 lbs. of Bone-meal to Jowar increased the yield by 350 lbs. of grain per acre.

The following seeds, manures and implements were sold by the Department during the year :—

	Rs.
(1) Seeds of the value of	427
(2) Manures of the value of	480
(3) Implements of the value of	932

The District Agricultural Overseer has arranged a campaign against Potato rust, treatment of mosambi for Gumoses; dusting of sulphur on figs and peas, distribution of leman caterpillers by Paris green and spraying for aphis on cabbage and other vegetables. The information of seed grading and smut propaganda is already given.

(2) *Ahmednagar District.*—In Ahmednagar District 25 large plots of dry farming were arranged in Nagar, Shrigonda, Jamkhed and Shevgaon talukas and about 50 villages have taken advantage of the sets of dry farming tools. The average yield of dry farming and the local method is given below :—

Taluka.	Treatment.	Yield per acre.	
		Grain lbs.	Karbi lbs.
Ahmednagar	Dry farming	507	1,755
Do.	Local method	350	1,179
Shrigonda	Dry farming	516	834
Do.	Local method	287	546
Jamkhed	Dry farming	422	1,919
Do.	Local method	248	1,522
Shevgaon	Dry farming	218	366
Do.	Local method	181	330

During the year, the District Local Board, Ahmednagar, permitted 28 teachers to help the department for demonstrating the agricultural improvements at a nominal remuneration.

The District Agricultural Overseer distributed 3,000 lbs. of N. R. seed and arranged 11 comparative plots of N. R. versus local cotton, 12 plots of Akola Bajri, 13 plots of Pusa wheat. In Akola Taluka, trials of Kolamba rice strains No. 42, 79 and 184 were arranged at Rajure and these strains have given 900 to 1,600 lbs. of more yield per acre over the local Raibhog rice. The yield of K184 was exceptionally high, viz., 5,760 lbs. per acre against 3,840 lbs. of local Krishnasal. He also arranged 4 Tobacco plots at Kalas and Pimpalgaon and supervised the work of soaking compartments, Sind method of flooding and the general work of Agricultural improvements under the Visapur tank.

(3) *Satara District.*—The District Agricultural Overseer arranged with the help of Agricultural Associations 12 plots of sulphur treated Jowar, 5 plots of Akola Bajri, 8 plots of groundnut manured with 200 lbs. of super phosphate, 4 plots Gujarat variety of Tobacco, 6 plots of Chillies manured with artificials, 3 plots of Turmuric and 2 plots of onions manured with 200 lbs. of Nitrate of Soda, 3 plots of Jayavant cotton, 4 plots of Pusa wheat, 6 plots of ginger, 7 plots of potatos for treatment on rust, 6 plots of Jowa under dry farming. All these plots have given increased yields varying from 10 to 20 per cent. over the local checks. He arranged 151 demonstrations and a big show at Karad. He distributed improved seeds of the value of Rs. 877. The Satara Taluka Development Association is managing a fruit garden for the supply of best fruit trees and seedlings which was one of the greatest necessities of this District. They had arranged a horticultural class and budding and

grafting are now done in several villages. During the year the following fruit trees have been distributed :—

		Rs.
1.	Mango grafts	639
2.	Basarai plantains	17,180
3.	Buded lemons	150
4.	Santras and Mosambis	1,105
5.	Figs	200
6.	Pomegranates	100
7.	Citrones	37

The association has also paid special attention for the improvement of poultry and the District Local Board has engaged a poultry expert for this District and 37 cocks and 58 hens of leghorn and 6 cocks and 6 hens of Rhode Island Red have been distributed in this District.

The following manures are distributed during the year :—

		Lbs.
(1)	Sulphate of Ammonia	12,356
(2)	Nitrate of Soda	1,595
(3)	Other artificials	1,200
(4)	Poudrette worth about	2,000

(4) *Sholapur District.*—The District staff arranged 114 demonstrations of seed grading—Groundnut and Jowar and dusting Jowar seed with sulphur dust, 39 demonstrations of interculturing Groundnut and Jowar, 98 demonstrations of standing crops and 6 bunding demonstrations. A big show was held at Mandrup. The following seeds, manures and implements were sold through the Department.

		Rs.
Seed worth	.. ..	280
Manure worth	.. ..	220
Implements worth	.. ..	189

The cultivators of Barsi Taluka graded 20,000 lbs. of Groundnut seed with a sieve specially prepared for this purpose and the effect of graded seed was seen by increasing the yield by 14 to 25 per cent. over the non-graded seed. The propaganda of seed grading was done in 13 villages through the teachers of the primary schools with the permission of the Chairman of the School Board.

The Sholapur District is specially well-known for construction of Tals and Bunds and this improvement was pushed on by starting Bunding societies and rural uplift association.

(5) *Canal tract.*—On the Deccan Canals, 5 plots of wider sowing of cane, 9 plots of selection of sets, 4 plots of reducing the sets from 10,000 to 6,000 per acre, 11 plots under cane varieties, 8 plots under manurial experiments and several plots under San green manure and 14 plots under miscellaneous experiments were arranged by the Divisional Superintendent of Agriculture, Deccan Canals, Baramati, and his staff. Besides

8 comparative trials of Banilla versus N. R. cotton, 40 manurial treatments and 16 cultural experiments on cotton were arranged. 14 trials of Groundnut varieties (Spanish peanut and big Japan) and 5 trials of Super phosphate of Spanish peanut were conducted. Akola Bajri was tried in 15 villages and everywhere it has given 25 per cent. more yield. Pusa wheat No. 4 was tried in 20 places and the following are the average yields per acre :—

	Lbs.
Baxi wheat	282
Pusa No. 4	747

The 12 implement Depots realised Rs. 243 in the form of hire of implements while the hire of Power Crusher came to Rs. 236. A co-operative Power Crushing Society was started at Nimbut with a capital of Rs. 8,645 and it has crushed cane of 33 acres and produced 794 boilings. The statement showing the cost per day is as under :—

Cost.	Boilings per day.							
	10	12	14	16	18	20	22	24
Cost.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Working Engine.	2 10 6	3 3 0	3 11 6	4 4 0	4 12 6	5 5 0	5 13 6	6 6 0
Harvesting Cane.	4 6 0	5 4 0	6 2 0	7 0 0	7 14 0	8 12 0	9 10 0	10 8 0
Labour ..	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0	10 15 0
Carting & Cane.	6 2 0	7 0 0	7 14 0	9 3 0	10 8 0	11 6 0	12 11 0	14 0 0
Gulva & Jalva.	8 12 0	10 8 0	12 4 0	14 0 0	15 12 0	17 8 0	19 4 0	21 0 0
Engine & Driver.	1 5 4	1 5 4	1 5 4	1 5 4	1 5 4	1 5 4	1 5 4	1 5 4
Total ..	34 2 10	38 3 4	42 3 10	46 11 4	51 4 10	55 3 4	59 10 10	64 2 4
Per Boiling	3 8 6	3 2 11	3 0 3	2 14 8	2 13 7	2 12 2	2 11 4	2 10 9

Sections III.

Agricultural Organizations.

(*a*) *Taluka Development Associations.*—The number of Associations remained stationary at 15. Except Patan and Nira Left Bank (Baramati) Associations all of them have put in good work. The Associations of the Satara District are doing more intensive work under the guidance of the District Local Board. Out of the 15 associations the Satara, Karad and Walwa Taluka Development Associations have been classed under " A " while Khed, Junnar, Madha, Karmala, Wai, Javali, Tasgaon,

Khatav, Khanapur, Koregaon and Patan have been put under "B" class. The Baramati Association has not done any substantial work and hence it is classed under "C".

(*b*) *Non-Credit Societies.*—The number of such societies in South Central Division is 20. The work done by these societies is given below :—

Name of Society.	Value of produce sold.
"*A*"—*Sale Societies.*	Rs.
(1) Haveli Taluka Agricultural sale society ..	1,11,238
(2) Nira Canal Societies Purchase and Sale Union, Baramati	4,34,000
(3) Barsi Taluka Sale Society	57,000
(4) Kurduwadi Purchase and Sale Union ..	30,034
(5) Warna Valley Co-operative Sale Union Ltd., Islampur	2,11,843
	Value of manure distributed.
"*B*"—*Manure Societies.*	Rs.
(1) Peth Manure Society	62
(2) Retre Hareax Manure Society (District Satara)	1,332
(3) Malkhed Manure Society	192
	Hire earned.
"*C*"—*Machinery and Implement Societies.*	Rs.
(1) Haveli Taluka Agricultural Machinery Society	1,656
(2) Pathardi Implements Society	468
(3) Sheogaon Agricultural Requisite Society ..	1,438
(4) Jamkhed Implements Society	585
(5) Madha Taluka Implements Society ..	133
(6) Tadavale Implements Society	101
(7) Pandharpur Taluka Implements Society ..	269
(8) Rui Chattisi Society (Unregistered) ..	174

Nimbut Machinery and Implement Society.—This Society is registered during the year. The results of this Society so far available for one season's working are very encouraging ; and it is hoped that the Society will give satisfaction to the members.

Section IV.

Agricultural Services.

(*A*) *Engineering Advice and Assistance.*—In spite of the effect produced by the "World Wide Depression," there were 32 applications from farmers for mechanical help. The Mechanical Assistant visited 30 sites

during the year under report out of which 7 were in connection with power crushers for cane, 14 for pumping plants on rivers and 9 for pumping plants on wells.

(*a*) *New Erections of the Power Machinery.*

(1) 8 B. H. P. National Tube starting crude oil engine with 2½" Centrifugal Pump; 1 huller and 1 flour mill for Mr. Sopana Babaji Mehetre of Derda Chandwad near Kopergaon.

(2) 10 B. H. P. National Tube start curde oil engine with 45 Chattanooga Mill for Mr. Shanker Barkoo Inamke, Belapur.

(3) 15 B. H. P. Blackstone C. C. Type crude oil engine on the concrete foundation to drive 92 Mill (already installed) for the Superintendent, Kopergaon Farm, Kopergaon.

(4) 22 B. H. P. Ruston Hornsby Cold Start Crude oil Engine with 92 Chattanooga Mill; counter shaft arrangement and power juice pump for the Nimbuth Power Cane Crushing Society, Nimbuth, near Baramati.

(5) Fitting of the 44 Chattanooga plant for hire round about Baramati.

(6) A crushing plant for Mr. Nana Pandhre was lined out but the complete erection of same could not be carried out due to the other important work having been taken at Nimbuth.

In addition, the Mechanical Assistant looked after the Departmental Machinery at Manjri Farm; Kopergaon Farm, Loni School; Rajankhole and Baramati.

As an effect of the propaganda made by the staff there are now 90 Power cane mills in the Division and a large number of pumping plants on wells and river banks too.

(*b*) *Improved Juice Strainers.*—(by Mr. Peter Rahatar). This has been actually in use at several places and was actually found useful by the farmers.

(*c*) *Furnace.*—The improved triple Furnace to take the place of Multiple Furnace is likely to be appreciated by the farmers due to its advocating saving of fuel and time.

(*d*) *Sites for mounting pumping plants on Floats.*—Several sites on the river Warna in the Walva Taluka were visited and more suitable sites require to be seen before the scheme could be undertaken.

(*e*) *Correction of wrong foundations made by local Engineers.*—There is a great demand for this kind of work by the farmers as the plants erected by the local engineers are found to give the farmers endless troubles; there are already 4 demands of this kind of work during the year.

(*f*) *Power Chaff-Cutter.*—The Power Chaff Cutter purchased last year from Sir Sassoon David Trust Fund was demonstrated in the Walva Taluka at Islampur, Padwalwadi, Ashte and Dudhgaon; and the work was much appreciated by the farmers. Full details of this work are given below.

Statement of Work done by the Powar Chaff-Cutter in the Walwa

1	2	3	4	5	Working hours. 6			
	Date.	Name of Farmer whose fodder chaffed.	Residence	Survey No.	starting time.	closing time.	Total Hours and Minutes.	Total Time.
1.	29th March 1932.	Sadashiv Sitaram Navere ..	Islampur ..	240	6·30	9·30	3·0	6·0
		Do. ..	Do. ..	240	2·10	5·10	3·0	
	30th March	Do. ..	Do. ..	240	6·0	9·30	3·30	6·48
				240	2·0	5·18	3·18	
2	3rd April 1932	Dhondi Rowji Kokate ..	Padwatwadi	1011	7·45	10·45	3	11·36
			Do. ..	1011	2·5	5·5	3	
	4th April 1932.	Do. ..	Do. ..	1011	7·40	10·40	3	
			Do. ..	1011	2·0	4·36	2·36	
	5th April 1932.	Do. ..	Do. ..	1011	7·0	10·30	3·30	3·30
3	8th April 1932.	Bapurao Dada Vagyani ..	Ashte ..	1225	7·30	10·30	3·0	22·15
		Do. ..	Do. ..	1225	2·0	6·15	4·15	
	9th April 1932.	Do. ..	Do. ..	1225	6·20	10·20	4	
					2·10	6·10	4	
	10th April	Do. ..	Do. ..	1225	7·10	10·10	4	
					2·5	5·5	3	
4	11th April 1932.	Hari Jotyaji Shinde ..	Dudhgaon..	72	6·0	10·40	4·40	17·40
					2·5	6·5	4·0	
	11th April	Do. ..	Do. ..	72	6·20	11·20	5·0	
					2·0	6·0	4·0	
5	13th April 1932	Dattaji Ganpatrao Kadam	Do. ..	227	6·0	10·17	4·17	8·17
					2·0	6·0	4·0	
6	14th April 1932.	Ramkrishna Kadam ..	Do. ..	940	6·0	10·40	4·40	8·40
					2·10	6·10	4·0	
								84·46

Note.—The total expenditure incurred (exclusive of the wages of the Kadbi stackers from the of Kadbi, the expenditure
This was comparatively more as the average daily

Taluka by the Agricultural Development Association, Islampur.

Details of Requirements				Weight, etc. of Fodder cut.			Particulars of Expenditure incurred and service charge to be recovered.			
7				8			9	10	11	12
Crude oil in gallons.	Cylinder oil in lbs.	Grease in lbs.	Cotton waste in lbs.	Weight of Fodder in lbs.	Number of carts chaffed.	Number of Kirbee bundles chaffed.	Drivers' Wages.	Depreciation and interest per day.	Cost of column No. 7	Total cost.
							Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1·5	1	..	..	1,219	2	400	1 5 0	1 3 0	0 12 3	3 4 3
1·7	1	..	..	1,385	3	450	1 5 0	1 3 0	0 14 3	3 6 3
2·9	2	½	½	2,340	5	600	1 5 0	1 3 0	1 15 0	4 7 0
							1 5 0	1 3 0	..	2 8 0
0·92	1	..	..	800	1	125	1 5 0	1 3 0	0 8 0	3 0 0
							1 5 0	1 3 0		
									3 14 0	11 6 0
5·56	3·5	½	½	4,518	5	600	1 5 0	1 3 0		
							1 5 0	1 3 0		
4·42	1	½	..	3,595	5	600	1 5 0	1 3 0	2 7 7	7 7 7
							1 5 0	1 3 0		
2·07	1	½	½	1,682	4	535	1 5 0	1 3 0	1 2 0	3 10 0
2·16	1	½	½	1,755	4	542	1 5 0	1 3 0	1 2 0	3 10 0
21·23	12·5	1½	½	17,294	29	3,852	15 12 0	14 4 0	12 11 6	42 11 6

Dharwar Farm at Rs. 1-12-0 per day) was Rs. 42-11-6 to cut a load of 17,294 lbs. i.e., per 100 lbs. cane to Rs. 0-3-11

working hours were 7 hours and 4 minutes only.

(B) Pig Killing Campaigns.

This work is becoming popular and new centres were found out for the work of Pig-Officer. He visited Konkan and Southern Division to organize the work of Shikar-party. The following statement summarizes the work done by him.

Serial No.	Name of area.	Time of operation.	Amount contributed by people.	Government grant.	Animals killed.
			Rs. a. p.	Rs. a. p.	
*1	Godavari Left Bank Canal..	July 1931 ..	66 15 4	31 15 8	18 pigs, 7 pregnant sows.
2	Mungi group	August ..	Organizing ..	Crop protection Society.	
3	Turkewadi group (Belgaum District).	September ..	Organizing ..	Pig Campaign through village Panchayat.	
4	Kalyan	October ..	62 8 0	62 8 0	2 deer, 4 Neel bulls, Sow.
5	Mungi group ..	December and January.	60 0 0	Nil.	2 Tuskers, 49 deer.
6	Sinhgad group ..	May and June.	30 0 0	25 0 0	21 pigs.

Besides this 36 wild pigs were killed in 18 villages of the Koregaon Taluka at a cost of annas 5 per kill.

(C) Field-embankments.

During the year under report the Bunding officer visited forty-two villages and was out in the district for 132 days. The work was conducted on the following lines:—

1. Disposal of Tagai loan applications.
2. Preparation of plans and estimates of land development.
3. Joint schemes of bunding.

(1) *Disposal of Tagai loan applications.*—Out of 29 applications on hand, 17 applications for Rs. 2,900, for improving 630 acres of land, were attended. The sites were inspected and the necessary advice regarding the specification and methods of construction of bunds and waste-weirs were given to the cultivators concerned.

(2) *Preparation of plans and estimates of land development.*—Out of 117 applications, only fifteen schemes covering an area of 690 acres for land improvement and incurring an expenditure of over Rs. 30,000 were worked out this year. The statement showing the number of applications for land development scheme is given below.

Statement showing the position of applications with the Bunding Officer, South Central Division, Poona, during the year 1931-32.

Serial No.	Name of District.	Tagai loan applications.					Private applications.				
		Balance from last year.	New.	Total on hand.	Disposed of.	Balance for next year.	Balance from last year.	New.	Total on hand.	Disposed of.	Balance for next year.
1	Poona	3	..	3	3	..	17	3	20	2	18
2	Sholapur	9	5	14	8	6	51	12	63	6	57
3	Satara	4	..	4	..	4	10	4	14	1	13
4	Ahmednagar ..	2	6	8	6	2	14	6	20	6	14
	Total ..	18	11	29	17	12	92	25	117	15	102

Besides 23 more schemes covering an area of 620 acres and involving an expenditure of 15,000 rupees were finished with their priliminary survey work.

(3) *Joint Scheme of bunding*—(*a*) *Alegaon* (*Sholapur*).—Efforts have been made to have a joint bunding over the Nala at Alegaon Midishingi in Sangola Taluka. The Mamlatdar of Sangola has received a deposit of Rs. 1,500 for this scheme.

(*b*) *Kharpuri Budruk* (*Poona*).—A joint bunding Society was proposed at this place, and the papers are sent to the Registrar Co-operatives Societies, Bombay, for necessary action.

(*c*) *Mulegaon* (*Sholapur*).—A bunding Society has been registered at this place. The lands were inspected and priliminery survey work was undertaken.

(*d*) *Thathavde* (*District Poona*).—Series of bunds have been put in this area, as per instructions of the Rural-Uplift association. This will serve a good demonstration in the Maval tract of Poona District.

(*e*) *Khed-Shivapur* (*Poona*).—Priliminery Survey of the fields has been made under instructions of the Deccan Agricultural Association.

The Bunding officer, had given several demonstrations of land improvement at Karad, where protection dam, contour-bunding, soaking compartments and improved type of waste-weirs were shown. At Mandrup show, he demonstrated terracing, protection dam, water-cushon arrangements to stop erosion of soil and construction of bunds. At Shevgaon he exhibited the wooden models, and gave lecture on methods

of bunding. He made survey of Padegaon Sugarcane Research Station and trained Mr. T. N. Chaugule in bunding work.

SECTION V.

Agricultural Education.

Loni School.—This is the 22nd and last year of the Loni School. Only second year course for 19 students was conducted during the year under report. Two teachers from Rural Schools were also trained for Agricultural Bias classes. Out of 19 students 17 appeared for the examination and 16 passed with credit.

This School has now turned out 357 students and 51 trained teachers during the last 22 years; and most of them have been found efficient workers either in Government and private institutions or in practical farming. The total expenditure of this School for the year under report was Rs. 7,292 and the total receipts were Rs. 1,941 including Rs. 216 contributed by District Local Board.

SECTION VI.

Co-ordination with the Officers of Revenue, Irrigation, Co-operative and other Departments.—There was a hearty co-operation between the officers of all the Departments mentioned above and several meetings were arranged with their help. The officers of the Revenue and Irrigation Departments presided over most of these meetings and local problems were freely discussed. The credit of holding big shows is mostly due to the untiring efforts of the Revenue Department.

Divisional Board of Agriculture.—The chairmenship of the Divisional Board was transferred to the Deputy Director of Agriculture, South Central Division on 1st November 1931 since which time three meetings were held.

District Local Board and Agricultural Department.—The work done by the Satara District Local Board in conducting the work of the 10 taluka Development Associations is well known and will be an object lessen for other Boards. Khan Bahadur D. B. Cooper, M.L.C., and President of the Satara District Local Board is taking personal interest in agricultural activities of the whole District and the results will be seen in general awakening of the cultivators in adopting agricultural Improvements. Satara District stands foremost in co-operative work and the interest taken by Mr. R. N. Rajadnya deserves special mention.

The District Local Boards of Poona, Nagar and Sholapur also allowed some teachers of the Primary Schools to undertake agricultural propaganda for introducing simple improvements but more liberal contribution towards effecting agricultural improvements is necessary.

Help to District Local Board Schools.—As usual all the District staff in this Division helped the Educational Department as well as the District Local Boards in conducting examinations of Agricultural Bias Classes and Vernacular Final Examinations in each District.

Miscellaneous.—During the year under report all the staff worked satisfactorily. The splendid record of the services of Rao Saheb D. H. Tagare, retired Inspector of Agriculture, Sholapur, has already been mentioned. The office of the Deputy Director had to cope with heavy work caused by the opening of the Sugarcane Research Station at Padegaon and amalgamation of Ratnagiri District and the work of the Head Clerk, Mr. P. T. Vishal, deserves special mention for conducting all the office work in an efficient manner.

V. V. GADGIL,

Deputy Director of Agriculture,

S. C. D., Poona.

Poona, 15th August 1932.

Programme of work for the year 1932-33 in the South Central Division.

Research.

(1) One of the main works in this Division is on Sugarcane and allied crops on canals. Research work hitherto done on Manjri Farm will now be done on the New Sugarcane Research Station, Padegaon. However, the work will be conducted in this Division on Kopergaon Farm and on plots in the Deccan Canal area on the following lines :—

(*i*) Water measurements for sugarcane and for other crops than cane.

(*ii*) Reducing the cost by low doses of Nitrogen in artificial top-dressings and also F.Y.M.

(*iii*) Trial of new varieties of cane superior in any way to Pundia.

(*iv*) Study of economic crops specially monetary to be taken in rotation with cane.

(*v*) Study of Adsali cane-growing.

Side by side with sugarcane, improvement in agricultural machinery, power and bullock power crushers, scum filters, etc., are being tested and studied.

The second important problem is about crop growing in famine areas and it is being studied on the following lines :—

(1) Different types of tals and waste-weirs and their effectiveness in the soil erosion.

(2) Finding out an improved strain in Jowar by selection or breeding for the famine area.

(3) Improving the yield by—

(*a*) tillage methods and

(*b*) seed-grading method.

In Ratnagiri District the work on rice and Nagli will continue.

Propaganda.

This will receive attention (so far as funds would permit) and it will continue to be conducted on the following lines so far proved successful :—

(*i*) Shows and demonstrations.

The extreme importance of the District Agricultural and Cattle Show at Pandharpur to be opened during November 1932 by His Excellency the Governor of Bombay has to be brought to the notice of the cultivators.

(*ii*) Experimental and demonstration plots in cultivators' fields, of varieties of crops, manurial treatment and graded jowar seed.

(*iii*) Spraying operations against—

(*a*) Tambera on Potatoes.

(*b*) Gum disease of Mosambees.

(*c*) Aphis on Lucerne.

(*iv*) Dusting of Mango grafts with Sulphur against Hopper and Mildew in Ratnagiri District.

(*v*) Anti-smut propaganda.

(*vi*) Village implement demonstrations.

(*vii*) Propaganda of graded-seed in Ahmednagar, Sholapur and Poona Districts through school teachers.

(*viii*) Demonstration of right-types of bunds and waste-weirs.

(*ix*) Fruit growing, prunning, etc. will be demonstrated on canals.

(*x*) Continuance of Mass propaganda, with the grant expected from the District Local Board, Nagar, to show only two problems—

(*a*) Dry farming methods and

(*b*) Storage of manure.

Continuance of similar propaganda (as regards dry farming methods) in Poona-Eastern part, and Khatav and Khanapur Talukas of Satara District.

(*xi*) A new line of propaganda which was started through Co-operative Credit Societies will be continued through the same Societies which have started work.

(*xii*) Training and demonstrations of Synthatic manure process.

(*xiii*) Tractor plowing in Sholapur on hire system if funds are made available.

Demonstration of Power Chaff Cutter through Walva Taluka Development Association and hiring the same.

Demonstration of Hand-chaff cutters in all Districts.

(*xiv*) Special propaganda on Nira Right Bank Canal to develope Sann green manuring and other crops and on all canals to develope Sann green manure to take advantage of the concession given for three years.

(*xv*) Rural uplift villages will be rendered the necessary help to develope agricultural propaganda.

(*xvi*) Organization of Sugar Factories with the help of cane planters and financiers.

Adult Education.

(*a*) Continuance of two days classes, before cotton and groundnut and Rabi jowar sowing, would be arranged at least at 6 to 10 centres on Nira Right Bank Canal.

(*b*) Special class to be arranged in Satara Nursery and Garden to train for one Crop growing like Grapes and Lemon, etc.

Agricultural Organizations.

No new organizations like Taluka Development Associations will be started. Attempts would be made to develope popaganda with the help of the District Local Board School Teachers and Co-operative Credit Societies. The old Institutions will be helped.

Agricultural Education.

Loni Agricultural School is now abolished ; Help will be rendered to Educational Department and the District Local Boards in conducting examinations of Agricultural Bias Classes and Vernacular Final Examinations in each District.

Agricultural Service.

Mechanical Assistance.—Help will be rendered for preparing estimates of power crushers, pumping, plants, etc. (owing to shortage of Travelling Allowance the work will be less).

Pig campaigns.—Although the Pig Killing staff is disbanded, such help as is possible in Co-operative Organization for this work, will be rendered.

Land Development Schemes.

Owing to abolition of the post of the Bunding Officer, S. C. D., Poona, these will be advised only in Sholapur District through (1) private,

(2) Co-operative and (3) Revenue Agencies by Mr. M. K. Shirole, Agricultural Overseer, with Headquarters at Pandharpur.

Publicity.

Articles will be contributed to College Magazine, Shetki Shetkari and local newspapers and lectures will be delivered.

Work in connection with seed, implements and manure supply will be continued as usual, and similarly the public will be assisted in spraying crops.

V. V. GADGIL,

Deputy Director of Agriculture,

S. C. D., Poona.

APPENDIX E.

Summary of Work done under the Deputy Director of Agriculture, Southern Division, Dharwar, for the Year 1931-32.

(1) I held charge of the Office of the Deputy Director of Agriculture, Southern Division, throughout the year. Rao Saheb Kottur continued as Cotton Breeder. Mr. S. V. Shevade, Cotton Superintendent, was transferred to Jalgaon and Mr. R. Y. Hulkoti was appointed in his place. Mr. Pavate, Head Master, Devihosur Agricultural School, was transferred to Poona as Inspector of Agricultural Schools and Mr. Chowgule took his place.

As a measure of retrenchment, three Graduate Assistants, Messrs. Deshpande, Pandit and Itgi were sent on leave preparatory to retirement and men from other Divisions were transferred to fill in their vacancies. The temporary post of the Bunding Officer was abolished and the hand deputed to that work had to be absorbed. The Kanara District was added to the Southern Division, as the post of the Deputy Director of Agriculture, Konkan, was abolished from 1st April 1932 and a few changes in the staff had to be effected. There were also some transfers from one Division to another due to reorganisation of cotton breeding work. During the year under report, therefore, transfers were more than normal. The temporary staff engaged for extension of cotton work round Hubli and Gadag with the aid of subsidy given by the Indian Central Cotton Committee, continued. An additional scheme for Athani was sanctioned and a Kamgar was appointed during the year to supervise the reserved area organised in that centre.

Season.

(2) Fair antimonsoon and good early monsoon showers opened the Kharif season with very bright prospects all over the Division. These rains were good even in the eastern dry tract (Yerinad) and kharif crops could be sown there too in time. Unlike in many years past the cultivators thought the year would be an exceptionally good one. There were continous heavy rains in the month of August in the Western wet tract (Mallad) and in the transition-tract (Gadinad), with a result that all kharif crops except paddy suffered from excess of moisture. The fields went weedy and the weeds could not effectively be removed. In Yerinad, on the contrary, there was a long break in July-August, which affected the growth of all kharif crops sown there. September rains were adequate all over the Division and they were very useful. October rains were far below normal; but with sufficient moisture in the ground, the kharif crops in Gadinad thrived well, whereas those in Yerinad suffered owing to want of moisture. November and December rains were very heavy and they were not useful. They spoiled the harvests of paddy and produced excessive moisture conditions very favourable for the appearance of pests and diseases especially rust on wheat. The yields of all crops except paddy were below normal. Kharif Jowar and pulses gave

50 to 80 per cent. normal yield. Cotton produced excessive vegetative growth and was late to mature. Pickings were overtaken by rains and the quality of cotton was spoiled. The crops also suffered from North-East winds and gave yields ranging from 60 to 75 per cent. normal. Groundnut gave almost the same yield. Wheat suffered from rust very severely and produced low yields ranging from 10 to 50 per cent. normal. Rabi Jowar suffered from stem borer and sugary disease and the yields ranged from 60 to 75 per cent. normal. Garden crops except betel vine thrived well and gave normal yields. The Agricultural season on the whole may be considered to be fairly good; but low prices of all Agricultural produce having continued, the cultivator has not been able to pay off his dues and is sinking deep into debt.

(3) The work done during the year is summarised under the same heads, as it was done in previous years to facilitate references and comparison where needed, viz. :—

(*a*) Research and experiments.

(*b*) Propaganda.

(*c*) Organisation.

(*d*) Services to the public.

(*e*) Agricultural education.

(*f*) General.

(*a*) *Research and Experiments.*

(4) *Dharwar Farm.*—Plant breeding work on cotton which is the main money crop of the Division continued to receive major attention. Jayawant cotton was grown in comparison with Dharwar No. I, Dharwar No. 2, Kumta and K. W. R. × 15 strain No. 17 on randomised plots in 6 replications; results obtained are given below :—

Name of variety.	Yield of Kapas per acre.	Gin per cent.	Wilt per cent.
Jayawant	815	27·0	1·2
Kumpta	715	25·0	12·5
Dharwar 1	525	27·5	33·8
Dharwar 2	781	29·8	1·2
K. W. R. × 15 Strain No. 17	747	31·0	2·1

Jayawant cotton resisted wilt and gave good yields. It was observed, however, to be later than Kumpta by about a week. K. W. R. × 15 strain 17 yielded better than Kumpta and ginned 4 per cent. more than Jayawant. It was as early as Kumpta both in flowering and opening of bolls. It is a promising cotton in reserve. Jayawant cotton resisted

wilt on the farm in all the plots, the percentage of attack being only 1·75 against 60 per cent. of Dharwar No. 1.

(5) The crosses between Jayawant and (Dharwar No. 1 × Rosea) Strain No. 15 done with the object of increasing the ginning outturn, were in F_3 generation. 2 out of 19 progeny rows resisted wilt to the extent of Jayawant and selection was done in these and other promising lines. Other crosses done with the same object were—

(1) Jayawant × Comilla .. .. 4·2

(2) Dharwar I × Comilla .. .. 4·2

(3) Jayawant × Million Dollar.

The first two were in F_2 generation and the last one in F_1 generation. They were studied for all important characters.

(6) *Selection of types immune to wilt.*—The resistant types so far obtained suffer from wilt though to a very small extent even under ordinary field conditions. With a lower temperature of 20° to 25° C as obtained in pots, the resistance breaks down to a great extent. For these reasons, selections in Kumpta and Jayawant cottons were made with the object of obtaining types immune to wilt. In the case of Kumpta cotton, a badly affected field at Bailhongal was selected and individual plants which showed no signs of wilt were selected. In the case of Jayawant cotton 12 plants were taken at random without any selection, as the variety was completely free from wilt at the time of picking. The plants so taken were sown individually on the Dharwar Farm in wilt affected plots and the results obtained are interesting. In Kumpta, the wilt percentage varies from 0 to 67, whereas in Jayawant the variation is only from 0 to 5·5. All the lines which had no wilt in them have been separately harvested and will be tested further.

(7) During the year under report all wilt resistant cottons were sown in July instead of in August (proper sowing time) in order to study their resistance under conditions more favourable to wilt. They suffered from wilt more than usual. Only Gadag No. 1 cotton was found to be completely free from wilt.

(8) Selfing of Jayawant and Gadag No. 1 cottons was done on an extended scale to meet the requirements of various seed multiplication schemes. 250 lbs. of Jayawant cotton seed was selfed sufficient to dibble about 60 acres for Hubli and Athani schemes and 300 lbs. Gadag No. 1 seed was selfed sufficient for growing 30 acres for Gadag scheme.

(9) *American cotton work.*—Sulphur dusting experiment against red-leaf-blight was continued with 9 replications according to students' method. Dusted plots gave on an average 354 lbs. yield per acre against 267 lbs. in the non-dusted plots. The increase in yield was 32·5 per cent. and it was significant. The cost of three dustings was Rs. 10 per acre, and the price of extra yield at the present low rate was only Rs. 7 per acre. Recent selections made in Dharwar-American cotton have yielded

some promising material. D. A. 2—6—5 gives 36 per cent. ginning outturn and resists red-leaf-blight better than Gadag No. 1. It will be compared with Gadag No. 1 on Gadag Farm during the next season. Four early strains of D. A. have been obtained from the material selected at Ron. They seem to be useful for crossing work. Gadag No. 1 cotton was crossed with Co. II and an early strain of D. A. The object of the first cross is to introduce red leaf resistant character and of the second to evolve early types with good staple.

(10) *Spinning and seed tests.*—Nine samples were sent to the Director of Technological Laboratory, Matunga for testing their spinning value. The following are the results :—

Dharwar No. 1–38 s, Jayawant—38 s, K. W. R. × 15–34 s, Dharwar No. 1 × Wagale—28 s, Dharwar No. 2 × 15–27 s, Gadag No. 1–30 s, D. A. strain 2—6—34 s, Verum 262—26 s, Banilla—13 s. Samples of cotton seed stored for distribution by Hubli and Gadag cotton sale societies were tested as usual for their quality. The percentage of germination varied from 89·5 to 92·5 in Gadag No. 1 cotton seed, received from Gadag and from 83·0 to 96·5 in Jayawant cotton seed received from Hubli.

(11) Selected strains of Fulgar white, Fulgar yellow, Bilichigan, Nandyal and Savnar varieties of Jowar were maintained and seed was distributed to the cultivators who demanded the same. The demand for Nandyal continued to be more than for others. Spanish peanut variety of groundnut Strain No. 5 was sown all over the farm, and seed was distributed round Dharwar, Haveri and Bailhongal. Selection in Pondichery variety was undertaken during the year with the object of supplying a pure high yielding type to the cultivators of Mundargi petha.

(12) The other important experiments conducted on Dharwar Farm under the guidance of the Farm Superintendent are summarised below:— Crop experiments :—Five varieties of Jowar, viz. Nandyal, Fulgar white, Fulgar yellow, Bilichigan and Muddinandyal were compared on Fisher's Method in five replications. Nandyal yielded better than others. Judging from the results of the past three years, no variety has consistantly given higher yields than others. It seems that season plays an important part in the case of Jowar. Five varieties of cotton, viz. Jayawant, Dharwar No. 1, Dharwar No. 2, D. I. × R and Kumpta, were compared on Fisher's method in five replications, Jayawant was found to be more resistant to wilt than these and yielded also more. Five varieties of wheat were compared but severe attack of rust vitiated the experiment. Two varieties of gram, viz. Burma and local were compared on Student's method in ten replications, Local gram was badly affected by wilt whereas Burma gram was found to withstand the attack considerably. The yield of Burma gram was therefore, more than double of the local. Four varieties of tobacco, viz. Nadiad No. 6, Nippani, Adcock and Pilu, were compared on fisher's method in six replications. The discease Cercospora appeared again during the year but it was not as bad as it was last year. Nadiad No. 6 gave more yield than others,

and has brought in better net profit on the farm than any other crop, even with low price of Rs. 4 per maund of 26 lbs.

(13) *Manurial Experiments.*—Results of experiments with different quantities of Farm Yard manure on Jowar crop are not consistant with those in previous years. Owing to low prices of Jowar grain the value of extra yield could not meet the extra cost of manure. The plots under 2½ tons every year has produced better results than others. Results on cotton are in favour of 15 tons every second year. Results of San green manure are again encouranging. The application of sulphate of ammonia on both Jowar and cotton produced more yields, but the value of extra yield was less than the cost of the manure in both cases.

(14) *Rotational and Cultural experiments.*—In a two year rotation experiment groundnut Jowar has given better results than cotton-Jowar or tobacco-Jowar. Groundnut and gram is found to be a better rotation to Jowar than groundnut alone or groundnut and wheat. In three year rotation series cotton-tobacco-Jowar-stands best. In seed rate experiment on groundnut, 80 lbs. seed rate has given better results than 60 lbs. Cotton and groundnut in alternate rows has given almost the same results as cotton and groundnut in blocks. Early sown groundnut has given better results than late sown one. Sieved and unsieved jowar seed gave no difference in yields. Length-wise and cross-wise growing experiment on wheat was vitiated by rust. There was little difference in yields of Jowar and cotton crops grown with improved (Mr. Schute's) and local seed drills. In the small garden, mangoes and figs continued to receive attention. Mangoes were dusted with sulphur against hoppers and figs against rust with good results.

(15) *Gokak Farm.*—Sugarcane continued to be the most paying crop on this farm. H.M. 544 was compared with local Pundya in good soil and with yellow mauritious in Kirl soil in 10 replications, and in both the experiments it gave higher yield. As reported last year J. 213 was compared with local Pundya in 10 replications. It was observed to be a semi-drought resistant variety. It tillers profusely and is resistant to borer attack. It ripened early and gave more yield. J. 213 seems to be a variety well suited to Gokak canal tract. Selection in local maize on the basis of weight of cob and proportion of grain to cob continued. Eleven selections were compared with general seed and two have been further selected. Maize and tur was compared with maize and Gadag No. 1 cotton in ten replications, and the latter was observed to be more paying. Cambodia cotton (C.O.2) was compared with Gadag No. 1 cotton in ten replications of 2 gunthas each. Cambodia gave 1,255 lbs. seed-cotton per acre whereas Gadag No. 1 yielded 932 lbs. The difference is significant.

(16) *Manurial experiments.*—Sulphate of ammonia 75 lbs. N. + cake 75 lbs. nitrogen per acre applied to sugarcane, continued to give better results than calcium cyanamide 75 lbs. nitrogen + cake 75 lbs. nitrogen per acre. Three artificial manures, viz. nitrate of soda, calcium cyanamide, and ammo-phos 80 lbs. nitrogen per acre with and without farm

yard manure were compared with no artificial manure according to Fisher's Method, again, on cotton during the year. Results of three years, conclusively prove that cotton does not respond to any notrogenous manures including farm yard manure. The experiment will be discontinued from next year.

(17) *Rotational experiments.*—The three year rotational experiment sugarcane—cotton—maize and tur versus sugarcane—cotton—san green manuring was continued during the year. Starting with sugarcane, only one plot has completed its cycle of three years. From the results of this cycle it is observed that maize and tur is better than san green manuring. The experiment will be repeated.

(18) *Nursery orchard.*—The nursery and the orchard continued to be a paying concern. The total receipts were Rs. 874 and the expenditure was Rs. 645 showing a net of Rs. 229. The demand for lemon seedlings has very much increased.

(19) *Mugad Rice Breeding Station.*—Four promising strains of Mugad, viz. Early No. 161, Inter Nos. 81 and 249 and Late No. 141 and three strains of Antersal, viz. Early 67, Inter No. 90 and Late No. 200 were compared with local again in replication series on Fisher's method and in seed multiplication plots on a large scale. In both places these strains continued to do better than local checks and have given 11·7 to 25·3 per cent. more yield. 4,200 lbs. seed of Mugad strain sufficient for about 50 acres and 2,700 lbs. seed of Antersal strains sufficient for about 33 acres has been raised on Mugad Farm during the year for multiplication and distribution in the District. The study of the crosses Mugad 81 and Kolamba 39 was continued. 12 pure strains of this cross were compared with a local fine rice to ascertain their yielding capacity and seven of them were found to be better yielders. They will be compared again during the coming season. Selection in Dodagya variety of paddy started during last year was continued. A few promising selections will be grown in progeny rows during the coming season.

(20) *Tegur Cattle Breeding Farm.*—The progeny of the cross between local cows and Amritmahal bull is showing marked improvement in its third generation. 11 Bull-calves and 17 cow-calves were born during the year. The total number of the herd on 31st March 1932 was 130 against 140 last year. The bull-calves produced on Tegur Farm have very much attracted the attention of the cultivators of Mallad tract. Results of crossing local sheep with Merino ram have also continued to be good. Hay and silage were prepared on the farm as usual and Jowar and Kulthi were grown both for grain and fodder.

(21) *Experiments in cultivators' fields.*—The district staff continued to conduct as usual experiments in cultivators' fields. Jayawant cotton was compared with local Kumpta in 6 places in Athani, Bailhongal, Bagalkot and Bijapur talukas. In all these places Jayawant cotton has given higher yields though the crop was observed to be slightly later.

C.O.2 cotton was compared with Gadag No. 1 in three places under irrigation in Gokak and Ranebennur talukas and it has given better results in all these three places. It was compared with N.R. and Banila at Bijapur where Banila gave better results than the other two. As there is still some belief that Dharwar-American cotton gives higher yield than upland, experiments were conducted during the year in good soil in four places in Gagad-Ron area and in three places out of four, upland gave higher yield. This experiment was also conducted on Kirl soil at Hurlapur where Dharwar-American gave better yield than upland. The experiment needs repetition in this place. Selected strain of Fulgar white variety of Jowar was compared with local in two places in Bailhongal and Haveri talukas. The yields in both places were higher and the strain has been appreciated by the cultivators. Arrangements have been made to multiply the seed locally. Savaner variety of Jowar did well at Bagalkot and Fulgar yellow and Billichigan at Chikkodi. Selected strains of paddy were compared with local, round Dharwar, Haveri, Hangal, Halyal, Belgaum and Mundgod and this gave higher yields in almost all places. Inter and late strains were found to be popular round Belgaum, Mugad 81 and Antersal 200 are liked round Dharwar. Late strains are popular under Dharma canal in Hangal taluka. Mudag Inter No. 249 is much liked in Mundgod Petha. Among wheat varieties Pivala Kathya strains Nos. 103 and 808 gave better results than local at Athani and Bijapur. Nadiad No. 6 tobacco was not compared this year with local but seed was sown on 150 acres in Chikodi Taluka on the results of previous years. The results of sulphate of ammonia on paddy and Jowar crops are not encouraging. The extra cost of manure was more than the value of the extra produce obtained. Dry farming experiments were conducted at Bijapur on a small scale and at Halli on a large scale. Deep ploughing has given better results than others in the small experiment, and cultivating with tine tooth harrow in the big experiment. Observations on these various experiments in cultivators' fields were made at regular intervals and harvesting was done under the close supervision of the District staff. All observations and yields have been recorded in experimental note books as was done in the past two years. A new experiment was undertaken during the year on the destruction of prickly pear with the aid of cochineal insects which is a parasite on it. A specimen was obtained from Mysore and the insect has now been successfully established in a dozen places. Its progress on a hedge at Mundargi in one year has been very encouraging.

(*b*) *Propaganda.*

(22) *District cotton work.*—Multiplication and distribution of Jayawant and Gadag No. 1 cotton continued round Hubli and Gadag respectively. The reserved area under Jayawant in Hubli centre was 17,640 acres and that under Gadag No. 1 in Gadag centre was 22,200 acres. The crop in these reserved areas was inspected from time to time and rouged. The produce was collected and ginned separately and the seed obtained has been stocked for distribution during the coming season. Jayawant seed

was multiplied round Bailhongal, Athani and Haveri also. The quantity of work done is sumarised in the following statement :—

Name of the variety.	Generation.	Quantity of seed distributed in lbs. in 1931-32.	Area in acres 1931-32.	Quantity of produce obtained in dokras.	Approximate quantity of seed purchased for distribution in 1932-33.	Quantity still to be purchased.	Total Quantity of seed to be stocked for 1932-33.
Jayawant ..	II	*Nil.*	*Nil.*	55	13,500	*Nil.*	13,500
	III	9,940	1,079	624	131,600	18,400	150,000
	IV	160,160	16,561	4,546	739,200	347,300	1,086,500
	V	1,003,518	100,352	6,554	*Nil.*	*Nil.*	*Nil.*
	Total.	1,173,618	117,992	11,779	884,300	365,700	1,250,000
Gadag No. 1	II	*Nil.*	*Nil.*	18	4,237	*Nil.*	4,237
	III	805	92	55	11,700	8,300	20,000
	IV	19,754	1,998	494	94,000	106,000	200,000
	V	205,567	20,424	5,242	623,000	255,000	878,000
	VI	1,030,824	103,082	5,982	62,300	35,463	97,763
	Total.	1,256,950	125,596	11,741	795,237	404,763	1,200,000

It seems necessary to note here that Hubli and Gadag cotton sale societies failed to purchase all available good seed from the reserved areas with a view to progress towards covering an area of 2 lacs acre contemplated in the schemes sanctioned by the Indian Central Cotton Committee. Some produce was sold without making arrangements to purchase seed and it was lost. This point was discussed at the time of the Registrar's visit to the societies and it was decided that seed sufficient at least for an area of 125,000 acres, should be stocked by each of these two societies for the coming year. As the prices of cotton were low, part of the produce from the reserved area remains yet unsold and attempts are being made to purchase more quantity of seed to make it up sufficient for 125,000 acres in each of these two places.

(23) The Indian Central Cotton Committee continued to give subsidy for additional staff, roguing, and incidental expenditure to Hubli and Gadag Cotton Sale Societies. These societies made profits during the year in their seed transactions and they are able to return the subsidy received for incidental expenditure.

(24) *Grading and auction sales.*—In all 7,165 dokras of Jayawant and 12,536 dokras of Gadag No. 1 cotton were graded for auction sales. The graded cotton fetched comparatively better prices than those prevailing in the market. Five auction sales were held at Gadag and three at Hubli. The top grade " Jayawant cotton " with a ginning percentage of 28·4

received a price of Rs. 130 per Naga (1,344 lbs.) when the prevailing rate for ordinary bazar cotton (mixture of Kumpta and Dharwar No. 1) was Rs. 120–123. Similarly the top grade of Gadag No. 1 with a ginning percentage of 34·0 received a price of Rs. 170 per Naga against Rs. 155 to Rs. 160 for ordinary Dharwar-American cotton (mixture of Dharwar-American and Upland).

(25) *Working of the Cotton Transport Act.*—89 licenses by rail and 746 licenses by road were issued from Gadag office to import 2,006 and 27,401 Dokaras respectively. The number of licenses issued from Bagalkot office was 13 by rail and 272 by road to import 535 and 6,735 Dokaras respectively. From Nargund only 115 road licenses were issued for importing 951 carts of cotton. The import by rail without licenses is completely checked and that by road is well controlled by inspecting all check stations and by making the licensing officers to regularly inspect all arrivals in Gadag, Bagalkot and Nargund markets. The Dalals' Associations in Gadag and Bagalkot markets have given agreements that any one who receives cotton from outside the protected area without license will be dismembered. The work of issuing licenses and inspecting the Dokaras coming into the markets was systemised during the year and rules were framed for the guidance of licensing officers and Dalals. With these arrangements illicit import of cotton by road is fairly well controlled though stray cases do occur here and there. The Cotton Transport Act is working well in the interest of the grower as well as the consumer of improved varieties of cotton in the Southern Division. I must make a mention here that inspection of check stations and tracing illicit import by road is engaging much attention of the district staff including that of the Deputy Director.

(26) *General District Work.*—As the grant under demonstrations was very limited, the District Agricultural Overseers were instructed to conduct their demonstrations mainly through the Taluka Development Associations and utilise the limited funds of the Department in places where such Associations do not exist. Demonstrations of successful standing crops of selected strains of cotton, paddy, Jowar, groundnut and tobacco in experimental plots received major attention of the district staff all over the Division. Propaganda in connection with the spread of selected strains of paddy in Mallad, of selected strains of cotton and groundnut in Gadinad and Yerinad, and of selected strain of tobacco in Chikkodi and Hukkri Talukas of the Belgaum District was very intensive. Propaganda for introducing the method of growing Tur as a row crop in maize in the Gokak canal tract was equally intensive. Series of small demonstrations were held in the interior throughout the Division and cultivators were invited to attend them and to judge for themselves the merits of standing improved crops. Besides these crop demonstrations, special attention was devoted during the year for demonstrations of stone roller and wheat thresher in Bijapur District. 23 such demonstrations were held in the district with good results. The progress made over these two items during the past three years is substantial. In Dharwar District, demonstrations of groundnut seed drill and seed sieves received particular attention. As a result of intensive propaganda, 42 seed sieves were

distributed in Gadag Division alone. Results of experiments with sieved and unsieved seed on Dharwar Farm are not encouraging; but the very idea of sowing sieved seed is liked by the cultivators and the propaganda is attaining success. In Belgaum District particular attention was given to Howard's groundnut digger which has attracted the attention of the cultivators. In all 19 demonstrations of different bullock power implements were held in this district. The use of iron ploughs is known to the cultivators all over the division and their demonstrations were limited to a few in number where absolutely needed. Demonstrations of Poona furnace and improved method of Gul-making were conducted in 16 places. Spraying potato crop with lime sulphur wash against the attack of jassides and fumigation of potato seed with petrol against potato moth were demonstrated to the cultivators of Belgaum at their own cost. Almost all growers of potato have now taken to spraying and many of them have built their own fumigation pits. As already stated in paragraph 26 of the last year's report, potato cultivation round Belgaum had become very risky owing to these two pests and the cultivators were on the point of abandoning it. They are very much pleased to find now that they can control these pests and can grow a successful crop.

(27) Agricultural and cattle shows were organised in 11 places in the Division (5 in Belgaum District, 4 in Dharwar District and 2 in Bijapur District). The local Fair Committees continued to take great interest in organising these shows under the guidance of the district staff and distributed prizes to cattle. During all these shows and at the time of other small demonstrations mentioned in the above paragraph, lectures were delivered on agricultural improvements and public attention was drawn to the points of direct utility to the respective tracts. Village officers were given demonstrations in many Jamabandi meetings held by the Revenue Officers.

(28) A very intensive propaganda in all directions preferably to be called "rural uplift" according to current ideas has been undertaken in a village called Kakhandaki in the Bijapur District with the aid of a donation given by a local gentleman named Mr. Shivappa Arali. The people of this village are willing to help themselves and considerable progress has been achieved during the year, under the close guidance of the Agricultural Department. The following is the brief account of work done during the year. A detailed economic survey of 425 agricultural families of the village was completed and four sub-committees were appointed to do different works. These are—

(1) Land Development Committee,
(2) Garden Committee,
(3) Education Committee.
(4) Sanitation Committee.

The Land Development Committee in its very first year under report purchased 12 iron ploughs and gave them on hire. An area of 500 acres was ploughed during the year with the help of these 12 iron ploughs. Side by side, the committee did intensive propaganda in the village to induce all cultivators to use iron ploughs and it is really a wonder to note

that about an area of 5,000 acres has been ploughed with small iron ploughs in that village. Six bunding schemes were got prepared by the bunding officer and their execution work is in progress. 70 acres salt land was got inspected by the Agricultural Chemist and plan of reclamation is under contemplation. The Garden Committee with the help of the fieldman has been able to plant 200 Mosambi plants in its model garden and help other garden owners in spraying, exposing roots and pruning their fruit trees. Education Committee has been able to open a girl school and to recruit 40 girls for it. It has also secured a teacher for this school from the District Local Board. The committee is paying special attention to the development of Agricultural Bias Class already started there. Sanitation Committee has rendered useful service by giving ordinary medicines to 50 patients and by making arrangements to keep drinking water in good condition. The committee is advising cultivators to store their manure outside the village and has approached the Collector for a piece of land to dig a series of manure pits. Good preservation of farm yard manure is under contemplation and a plan is being prepared. Besides, the abovementioned activities, this Samstha has maintained a breeding bull which it has secured from Bijapur Anti-famine Institute and is giving free service to selected cows. The start made by the Samstha has been splendid and it shows what can be done in a village where people are willing to help themselves. The success achieved so far is largely due to the intensive propaganda done by the Department and co-operation of the leading men of that village.

(29) *Propaganda against Smut on Jowar.*—The work was continued through Revenue Officers and taluka development associations. The district staff conducted a number of demonstrations on the right method of treating Jowar seed with sulphur-dust against smut. All the Mamlatdars were requested to dispose off the remaining copper sulphate packets and give indents for sulphur-dust packets. The response so far has only been moderate. The district staff was requested to select a few villages in their charge and to do intensive propaganda by way of actually treating the seed of all cultivators of those villages. The results of this action where taken are very satisfactory. The outbreak of smut disease during the year was only moderate.

(30) Propaganda through the Kanarese Agricultural Magazine was continued and many interesting articles were published in it. The Magazine Committee has been re-organised with the Deputy Director of Agriculture as Chairman and Mr. V. S. Kulkarni as Editor. The cultivators are not still in a position to realise the importance of propaganda through press directly as they do it through occular demonstrations; but attempts are being made to attract the attention of the village teachers and other educated men in the rural areas and to broadcast the useful information through them.

(c) *Organisation.*

(31) Agricultural organisation is developing well in the Southern Division mainly on the farm of co-operative sale societies. The Hubli

and Gadag cotton sale societies continued to do good work. They have largely increased the scope of their work by adopting new seed multiplication schemes subsidised by the Indian Central Cotton Committee. These are the only two societies, I think, in the whole of India, which are distributing a large quantity of pure pedigree seed, every year with an organised plan of work to stand by. The Bailhongal cotton sale society has not yet been able to get out of the boycott of Dalals. Other cotton sale societies have not done much. The position of work done by different cotton sale societies during the year are tabulated below :—

Name of Society.	Number of Members.	Share Capital.	Reserve Fund.	Number of Dokaras sold.			Value of Cotton.
				By auction.	By private sale.	Total.	
		Rs.	Rs.				Rs.
Hubli	2,605	17,498	21,026	5,601	8,671	14,172	415,000
Gadag	2,175	41,586	47,828	6,892	6,107	12,999	415,744
Haveri	84	6,820	586	..	1,822	1,822	41,000
Dharwar ..	379	5,340	1,464	636	119	755	20,538
Bail-Hongal ..	Has not done any work due to boycott.						
Bagalkot	215	5,470	163	..	627	627	21,734
Bijapur	172	3,045	1,033	..	131	131	47,154*

* This includes value of 5,000 bags of cereals sold.

The Nippani tobacco sale society sold Jarda worth Rs. 11,553 against Rs. 37,347 last year. The fall is mainly due to depression. The Sankeshwar general sale society sold different articles worth Rs. 25,228 against Rs. 31,422 last year and earned a net profit of Rs. 425 against a loss of Rs. 100 last year. The chilly sale society at Byadgi was turned into sale union. 13,822 maunds chillies worth Rs. 33,516 and other articles worth Rs. 1,000 were sold during the year. The income was Rs. 2,185 whereas expenditure was Rs. 2,545. There was a loss of 360 to the society.

(32) Other forms of agricultural organisation are seed, implement and manure societies, cattle breeding societies and fencing societies. The seed societies at Devihosur and Hulkoti continued to do good work. Others showed no appreciable progress. Implement societies are not working well on the whole. Among manure societies Bellad-Bagewadi did fairly good work. Cattle breeding societies are realising the benefits derived by introducing pure Mysore bulls; but need considerable improvement in their working. Benefits of co-operative fencing against wild pigs are recognised by the cultivators all over Mallad but joint action is getting difficult owing to the apathy of the absentee landlords. Legislation to compel the minority is absolutely necessary for substantive progress as I have already stated in my previous reports. The fencing scheme at Tegur is pending only on account of four individuals not agreeing. They are being induced and it is hoped that

they will join. 90 out of 96 cultivators have paid their share capital and two have promised to pay. Papers are ready for registration and the cultivators are anxious to start fencing work soon before the paddy crop flowers. This scheme is a complete enclosure and protects an area of 1,300 acres. The paddy land coming in the scheme has good water supply and is capable of growing sugarcane. A large portion of Mal land is fit to grow groundnut. The scheme on the whole is a very prospective one and deserves all support. Individual cultivators purchased during the year three miles netted wire fence worth Rs. 3,600 and help was given to erect it. In Mundargi Petha three more co-operative societies are being attempted.

(33) Campaign for destruction of prickly pear was continued in Mundargi Petha of the Dharwar District. The Mahal Development Association which was organised last year is devoting major portion of its attention to this work of destroying prickly pear. An amount of Rs. 4,221 was collected from the farmers and an amount of Rs. 2,606-4-0 was paid to Government towards repayment of Tagavi loans taken for this work. An amount of Rs. 267 was spent for purchasing special poisons for killing re-growths in the villages where prickly pear was removed. The spread of Cochineal insects has been fairly good on prickly pear at Mundargi and the bushes are dying out. Demand for these insects suddenly rose and they have been sent to many places in and outside Mundargi Petha.

(34) The crop protection campaign against wild deer was continued at Mallapur, Kaujageri and Balganur. One more village Beloanki was taken up during the year. The Ron Taluka Development Association controlled the work of the first two and Gadag Taluka Development Association managed the third, the fourth worked independently. Collections were not as good as those in the previous year. Only an amount of Rs. 212 was collected in the first three villages and an amount of Rs. 340 was spent in all during the year. 119 deer were accounted for as killed and many more were scared away. The total protected area was 21,000 acres. This work needs more pushing.

(35) A co-operative crop protection society against wild pigs was started during the year at Turkewadi in the Belgaum District and hunting operations are in progress. An association for the same purpose for Khanapur Taluka is being attempted as the attack of wild pigs and elephants has very much increased there.

(36) *Taluka Development Associations.*—Thirteen taluka development associations continued to do work during the year. According to recent classification, seven are "A" class associations and others are in "B" class. No new associations were organised. The leading men of Halyal Taluka have collected an amount of Rs. 4,000 and are anxious to have a development association. The following are the important items of work done by various associations.

The Gadag and Ron Taluka Development Associations continued to conduct crop protection campaign and propaganda for Gadag Cotton Sale Society. They helped the sale society in organising its seed depots and induced cultivators to sell their improved cotton by auction sale

through it. These associations also conducted comparative trials of Gadag No. 1 and Dharwar-American cottons to convince the cultivators of the value of the former. It is very gratifying to note that these associations and Gadag Sale Society are working together with a common aim. Gadag association has continued to hold its position in " A " class. The Hangal Taluka Development Association did good work in connection with the spread of selected strains of paddy and attempted to remove the grievances of irrigators under Dharma canal. The Hirekerur Taluka Development Association attended to cattle improvement by working in co-operation with the cattle breeding societies and is trying to undertake some intensive work in a part of the taluka with a dozen premium bulls. The association did propaganda work for the chilly sale union at Byadgi and for the introduction of small iron ploughs for cultivation in chilly fields. The Haveri Taluka Development Association worked for the spread of Jayawant cotton and Spanish peanut variety of groundnut. It has an agricultural graduate to work under it and has come in " A " class. Bijapur and Indi associations were busy with the question of their amalgamation with the Anti-famine Institute and did only fair work. The gardens could not receive full attention. The Athani association is working in co-operation with the Agricultural Department in organising the cotton seed multiplication scheme for that area and is giving particular attention to land improvement in the form of bunding. The Chikkodi association continued to do good work in connection with the spread of artificial manures. The Gokak association paid particular attention to introduce the system of growing Tur as a row crop in Kharif maize and attempted to remove the grievances of the irrigators under Gokak canal. They represented their grievances to the Director and took a deputation to the Commissioner, S. D., with a result that water rates were reduced to a certain exent. The Murgod Mahal Development Association continued to work for the spread of Jayawant cotton and field embankment. The Mundargi Mahal Association gave special attention to the removal of prickly pear and organised a good agricultural show. All these associations conducted demonstrations of improved implements and selected strains of crops in co-operation with the district staff of the Agricultural Department. They also did extensive propaganda for copper sulphate and sulphur dust against smut on Jowar. The total amount of subsidy given to these associations was Rs. 7,729, during the year. The importance of taluka development associations is being realised by the cultivators.

(37) The Dharwar District Agricultural Association is being revived. A new managing committee has been formed which is taking interest in the work of the association. A new publication committee has also been elected and attempts are being made to improve the magazine. The Collector of Dharwar Mr. J. F. B. Hartshorne, B.A. (Oxon.), I.C.S., and the Deputy Collector, III Division, Mr. D. B. Deshpande, are taking keen interest in reviving the association. Rural uplift work in a village is under contemplation.

The Wilson Anti-Famine Institute at Bijapur continued its activity in various directions especially in running its depots and in the spread

of Jayawant cotton. The District Agricultural Overseers worked in co-operation with the Institute in all its propaganda.

(38) The Divisional Board held its quarterly meetings regularly and guided the work of the District Officers and taluka development associations as usual.

(d) Direct Services to the Public.

(39) *Field Embankments.*—One bunding officer continued to work in Dhawar and Belgaum Districts throughout the year and the other in Bijapur District till March 1932 when his post was suddenly retrenched. When demand for expert advice on bunding has considerably increased and when more staff was a pressing need as reported on various occasions, the retrenchment of the existing post is a severe blow to the progressive work. Bunding is the major agricultural improvement for major portion of the Bombay Presidency and it requires special consideration by the Director of Agriculture and Government. Its work in the Southern Division is much appreciated by the cultivators and its growth should not be crippled. In the Bijapur District plans and estimates were prepared for 32 schemes costing Rs. 22,500 in 24 villages. Out of these, 21 depended on Tagavi loans and the remaining 11 were for land-owners who could spend their own money. The bunding works in progress were inspected from time to time and instalments of Tagavi loans were recommended. The rate of interest on Tagavi loans having gone up, the cultivators are not so anxious to approach for them as they were before. In Dharwar and Belgaum Districts 30 schemes costing Rs. 25,720 were prepared. An experiment on "Spacing of bunds" was laid out on Dharwar Farm to verify the observations made in cultivators' fields. Two plots on Bankapur Farm were levelled and bunded. Attempts were made to put in small bunds with the caterpiller tractor plough at Mundargi; but they were not successful. The problem is under consideraion of the Burma Shell Company. Captain Munn of Hyderabad Government visited Southern Division, inspected some bunding sites and prepared a note for organisation of bunding work in Hyderabad State in consultation with the Deputy Director of Agriculture, S. D., and the Bunding Officer. Mr. Kurpad, the Deputy Director of Agriculture, Karnatak Division of Hyderabad State, Mr. Gopal Krishna Raju, the Deputy Director of Agriculture, Bellari, and Bunding Officer of Nasik Division were also taken round and were shown some bunding works. At a stage when bunding work was getting very popular it needed strengthening instead of retrenchment.

(40) *Work of the Mechanical Assistant.*—There were 24 applications during the year for plans and estimates of pumping plants and 17 were dealt with. Four pumping plants were erected. One in Belgaum District and the other three at Bijapur and Karjol in Bijapur District. One Chatanuga cane crushing mill was erected at Suraleshwar in Dharwar District. Demand for erecting pumping plants is increasing especially in Belgaum and Bijapur Districts. The Mechanical Assistant continued to be fully busy. In addition to the above works, he attended

to the machines working on different farms of the Division and their repairs.

(41) *Karjgi Fodder Storage.*—The bales in two stacks lying outside were removed to tin shed to save the cost of thatching and two big stacks were repaired and re-thatched. The machinery were also attended to. There was no demand for fodder during the year as the season was very good for the growth of all kinds of fodder.

(42) *Tractor Ploughing.*—The work of tractor ploughing for removal of Hariali a deep-rooted weed was continued by the Burma Shell Company under the guidance of the Agricultural Department. The Agricultural Department canvassed the required area at fixed rates and inspected the quality of work done. Two Lanz, two caterpiller and one Mecormic-Deering tractors were at work and 475 acres of land were ploughed, 165 acres to a depth of 10 inches and 310 acres to a depth of 12 inches. There were considerable breakdowns and the out-put of work was low. In most places 12″ ploughing is necessary for removal of Hariali and the ploughs available in the market were not suitable for the purpose. The existing ploughs which are meant to go only 10″ deep were made to go 12″ with the addition of a sheet to the mould-board which demanded higher power than what the Lanz and Mecormic-Deering tractors could produce. A suitable plough to go 11″ to 13″ deep, in black cotton soil is what is needed and the Burma Shell Company is trying to get one manufactured. Tagavi loans amounting to Rs. 7,974 were recommended for the cultivators to the Collector and the amounts were paid to the firm direct by the treasury, on the certificate issued by the Deputy Director of Agriculture, Southern Division. It is gratifying to note that Burma Shell Company is trying to solve the problem of removing Hariali by tractor ploughing. A good deal of land is affected with this deep-rooted weed in the Southern Division and manual and bullock power is too insufficient to deal with it. Hand digging is a very slow, sometimes costly, operation. Iron ploughs drawn by bullocks are used to a certain extent for removal of Hariali to a depth of 10″, but the number of bullocks available for the purpose is too limited to do any extensive work. The land affected with Hariali 12″ deep cannot be dealt with by bullock power and hence there is considerable scope for tractor ploughing.

(*e*) *Agricultural Education.*

(43) The Vernacular Agricultural School at Devihosur completed its eighteenth year and it was continued to be managed by only one Graduate Assistant. 92 applications were received for admission but only 14 students were admitted. Out of these 14 students 6 were admitted without any scholarship and 8 with reduced scholarship of Rs. 5 per month. Most of these are sons of farmers. As regards their previous educational qualifications 8 have passed their vernacular final examination with agricultural bias and one ordinary vernacular final examination. These facts prove the growing popularity of the school. Fifteen students in the first year, 20 in the second year, and one vernacular teacher for agricultural bias class received education in the school during the

year. Results of annual examination continued to be satisfactory. All students in the first year, 16 out of 20 in the second year, and the vernacular teacher passed. In all, therefore, 32 passed out of 36. The number of past students of Devihosur school to-day is 215 and it is gratifying to note that 130 of them are reported to have taken to private farming. Twelve students attended the Annual Social Gathering of the school with reports of work done in their farms and cultivation sheets for discussion. Some past students are doing splendid work and their farms have served as demonstration to the neighbouring cultivators. The health of the students always remained excellent though the boarding charges were very moderate and never exceeded Rs. 7-11-0 per month per student. The school is remarkably noted for its attempt to improve the character of its students. The relations between the teachers and the taught continued to be sound. Distinguished officers and visitors like the Director of Agriculture, Collector of Dharwar and the Nawab Saheb of Savnur have recorded very good remarks.

(44) Examinations of all agricultural bias classes were continued to be conducted by the district staff of the Agricultural Department and the Head Master of the Devihosur school. With increasing number of these classes the work of examining the students is much increasing and I must reiterate that the district local boards should be advised to have their own examining staff. I should like to suggest that every district local board should select a rural area favourable for agricultural bias education and convert the existing schools there into agricultural bias classes, and concentrate supervision by appointing suitable supervisors. These classes are at present very much scattered and they do not receive proper supervision and guidance. I should also like to point out that training given to the teachers for 10 months at Devihosur school is not enough. A separate training school is a need.

General.

Other important events of the year were as under :—

(45) The Director of Agriculture toured for two weeks in the Division and inspected various institutions and district work of the Department. He made many valuable suggestions for guidance.

(46) Dr. Burns, the Economic Botanist to the Government of Bombay, toured in the Division for eight days. He inspected the work of plant breeding and made many valuable suggestions.

(47) The Agricultural Engineer, the Live Stock Expert, the Plant Pathologist, the Horticulturist and the Agricultural Chemist visited the Division in connection with various important works undertaken by the Deputy Director and gave valuable advice.

(48) The Deputy Director attended Crop Research Committee meeting of the Department in Poona, the Railway Board meetings at Bangalore and the Forest Committee meetings at Dharwar. The important move made by him in the Forest Committee meeting was to secure free of cost timber for implements worth Rs. 2-8-0 for every deserving cultivator in forest villages and it is pleasing to note that this concession has been

granted. He opened the agricultural show at Aigali and presided over the conference.

(49) The Thirteenth Divisional Conference of the officers of the Agricultural Department in the Southern Division was held at Dharwar.

(50) A big demonstration of tractor ploughing was held by the Burma Shell Company at Gadag when the Director of Agriculture, Madras, the Director of Industries, Madras, the Deputy Directors of Agriculture, Southern Division, Dharwar and Bellari, the Assistant Agricultural Chemist to the Government of Bombay and representatives of different firms were present. The existing ploughs were found to be unsuitable for a depth of 12" and the manufacture of a suitable plough was fully discussed in a meeting.

(51) The Deputy Director visited Sangli for enquiry in connection with import of Waradi cotton from Sholapur District and submitted a report to the Director of Agriculture, Bombay Presidency, Poona.

(52) The Gadag Dalals and merchants took a deputation to the Director of Agriculture and the Indian Central Cotton Committee in Bombay in connection with the continuance of licenses issued to the villages of Kopbal, Kustgi and Yelburgi Talukas of the Nizam's Dominions. The Deputy Director of Agriculture, Southern Division, had to lead the deputation.

(53) The irrigators of Gokak canal tract took a deputation to the Commissioner to represent their grievances and the Deputy Director of Agriculture, Southern Division, was required to be present on the occasion.

(54) A new cotton seed multiplication scheme was sanctioned for Athani area during the year and 20 acres and 27 gunthas of land adjoining Dharwar Farm was taken on lease and added to it for seed-multiplication.

(55) The activities of the Agricultural Department in the Southern Division continued to extend. The work in connection with Hubli and Gadag cotton seed multiplication schemes and in connection with tractor ploughing became more complicated and the Deputy Director had to devote major portion of his attention to these two subjects. The new paddy seed multiplication scheme had to be brought in force and this work was also very exacting. The growing work in various directions could not be curtailed and the staff had to work hard with limited funds at their disposal, under continued retrenchment. All the members of the staff except very few did good work. Many revenue officers and private gentlemen continued to help our propaganda and organisation work and my thanks are due to them. The disturbed political atmosphere had no effect on the progress of our work, but continued fall in prices of all agricultural produce has discouraged the cultivators to a great extent. It is hoped, however, that the situation will soon improve with necessary adjustments.

S. S. SALIMATH,
Deputy Director of Agriculture,
Southern Division, Dharwar.

Programme of work under the Deputy Director of Agriculture, Southern Division, for the year 1932-33.

Research and Experiments.

(1) *Cotton Breeding Work.*—Selfing Jayawant and Gadag No. 1 cottons will be continued for multiplication of seed required for Hubli, Athani and Gadag centres. 250 lbs. Jayawant and 300 lbs. Gadag No. 1 cotton seed will be obtained by selfing. Different varieties of cotton will be tested for wilt resistance under rigid laboratory conditions and wilt resistant plants will be selected from the same and tested under field conditions. The crosses Jayawant × strain 15, Dharwar No. 1 × Comila, Jayawant × Comila and Jayawant × Million Doller will be studied further. Other useful crosses will be maintained pure. Selection in Dharwar-American cotton will be compared with Gadag No. 1 cotton on Gadag Seed Farm. Seed testing, spinning and sulphur dusting experiments will be continued.

(2) *Jowar Breeding Work.*—Fulgar yellow, Fulgar white, Nandyal, Bilichagan and Savaner selected strains will be maintained by selfing and will be grown on Dharwar Farm on a small scale to multiply the seed for distribution.

(3) *Groundnut Breeding.*—Spanish peanut variety of groundnut strain No. 5 will be multiplied on the farm for distribution in the district. Selection in Pondicherry variety will be continued.

(4) *General experiments on Dharwar Farm.*—Under crop experiments tobacco, jowar, cotton, gram and wheat varieties will continue to be compared. Under manurial experiments, sulphate of ammonia will continue to be tested on jowar and cotton. San green manuring and farm yard manure experiments will be repeated. The two and three year rotation experiments on groundnut and cotton in alternate rows and seed rate experiment on groundnut will also continue.

(5) *General experiments on Gokak Farm.*—Under crop experiments, sugarcane and tobacco varieties will continue to be tested. Under manurial experiments, artificial manures on sugarcane will be continued. Artificial manure experiment on cotton will be discontinued. Selection in maize and fruit gardening will receive more attention.

(6) *Rice Breeding Work.*—Selected strains of Mugad and Antersal varieties of paddy will continue to be multiplied on Mugad Farm for distribution. Selections from Kolamba cross will be compared with Mugad 81. Selections in Dodagya variety of paddy will be grown for further selection. All Gonag types and wild rices will be maintained.

(7) *Experiments in Cultivators' Fields.*—Selected strains of cotton, jowar, paddy, tobacco, wheat and groundnut will be compared with local in suitable places of the Division. Sulphate of ammonia will continue to be tested on jowar and paddy crops. Dry farming experiments on holding scale will be continued in Bijapur District.

Propaganda.

(8) Demonstrations of improved implements, especially wheat-thresher, stone-roller, groundnut-digger, Mr. Schutte's seed-drill and tractor ploughing will continue. Demonstrations of successful crop experiments in Government farm and cultivators' fields will be held as usual. Spread of Jayawant and Gadag No. 1 cottons will receive major attention of the District staff. The work of issuing licences at Dharwar, Gadag, Bagalkot and Nargund will be continued. All check stations will be inspected and attempts will be made to stop all illicit import of inferior cotton into the protected areas of the Division. Spanish peanut variety of groundnut strain No. 5 will continue to be multiplied and distributed round Dharwar, Bailhongal and Haveri centres. The spread of Nadiad No. 6 tobacco will be concentrated in Chikodi and Hukeri talukas of the Belgaum District. Bunding and fencing works will receive the usual close attention though the post of the Bunding Officer is abolished. Agricultural shows and conferences will be organised in suitable places. Village officers will continue to receive instructions on agricultural improvements in Jamabandi meetings. Lectures and demonstrations will also be held in co-operative training classes. The rural uplift work undertaken at Kakhandiki village will be continued.

Organisation.

(9) Our close work with cotton sale Societies will continue. Cattle-breeding societies will be inspected from time to time and advice will be given where needed. There is little scope for small seed, implement and manure societies. Attempts will be made to work through the credit societies for distribution of implements and seed and manure. Joint fencing schemes on hand will be brought into existence and new schemes will be attempted. Legislation to compel the minority is absolutely needed for further progress in fencing. Removal of prickly pear against wild pigs in Mundargi Petha and crop protection campaigns against deer in Gadag and Ron talukas will continue. Taluka Development Associations will be guided to work according to the programmes drawn for them. No more new Associations will be attempted except one at Halyal which has collected large funds and which is pending for a very long time. The Wilson Anti-Famine Institute will continue to receive close guidance.

Direct Services to the Public.

(10) *Field Embankments.*—As the post of the Bunding Officer is abolished, the work in Bijapur District will be entrusted to the District Agricultural Overseers who have been trained in bunding. In Dharwar and Belgaum districts, bunding work will continue to be done mainly by Mr. Mutalik-desai.

(*b*) *Boring Work.*—This will be suspended until further orders from the Government.

(c) The Mechanical Assistant will erect pumping plants and power cane crushers. Many applications are on hand. He will also inspect farm machinery.

(d) All copper sulphate packets on hand will be distributed and sulphur dust packets will be ordered for distribution against smut on jowar.

(e) Tractor work will be continued in co-operation with Burmah Shell Co., Bombay.

(f) Tagai loan applications for various agricultural improvements received through Revenue Officers and Co-operative Societies will be attended to.

(g) Examinations of agricultural bias classes will be continued.

(h) Inspection of individual farms for technical advice will be restricted only to deserving few cases.

S. S. SALIMATH,

Deputy Director of Agriculture,
Southern Division, Dharwar.

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APPENDIX F.

Summary of Work done under the Deputy Director of Agriculture, Gujarat, Surat, for the year 1931-32.

I—Staff.

I held charge of the office of the Deputy Director of Agriculture, Gujarat, Surat, for the year 1931-32. In addition to my duties I held charge of the Cotton Superintendent, Surat's post, from 1st July 1931 to 20th August 1931.

2. Mr. C. S. Patel, the Cotton Superintendent, Surat, was promoted as Deputy Director of Agriculture, N. C. D., Nasik, from 1st July 1931 and Mr. M. L. Patel, the Cotton Breeder, South Gujarat, Surat, held charge of the Cotton Superintendent, Surat's post, in addition to his own duties from 21st August 1931 until he was relieved by Mr. T. V. Nagarsheth, Inspector of Agriculture, Ahmedabad, on 15th December 1931, who was appointed to officiate as Cotton Superintendent, Surat. Mr. Nagarsheth worked as Cotton Superintendent, Surat, till the end of the year, i.e., 31st March 1932.

3. The post of the Divisional Superintendent of Agriculture, N. D., Ahmedabad, was kept in abeyance since August 1931 as a measure of retrenchment and Mr. T. V. Nagarsheth, the Superintendent, Surat Farm, was appointed as Inspector of Agriculture, Ahmedabad, for the District of Ahmedabad. Kaira and Panch Mahals were taken over by the Deputy Director of Agriculture, Gujarat, himself with one District Agricultural Overseer in charge of each District.

4. Mr. K. B. Naik, the Divisional Superintendent of Agriculture, N. D., Ahmedabad, being very ill, proceeded on leave on medical certificate from the date he was relieved, viz., 7th August 1931 and was on leave till the end of the year.

5. Messrs. G. P. Pathak and L. N. Patel, who were deputed to work as Control Officers in the Cotton Boll-worm Control Scheme financed by the Indian Central Cotton Committee, reverted to their posts in the Department from 1st February 1932 and proceeded on leave on average salary for two months.

6. Since Mr. Nagarsheth's transfer to Ahmedabad as Inspector of Agriculture, Mr. J. G. Naik, Graduate Assistant of the Surat Farm, was appointed as Superintendent, Surat Farm.

II—Season.

7. The monsoon started in July throughout the Division. July rain was deficient in North Gujarat, but was excessive in Surat and Broach. August rains were heavy throughout the Division. September and October rains too were good. The rainfall was above normal.

8. Heavy rains of July and August did not permit field operations and the weeds were in plentiful. These checked the growth of all Kharif

crops including cotton. In many places cotton was re-sown in September and October and the crop was late and poor.

9. September rains interfered with grain formation in Bajri and Maize and October rains damaged the ripe crops of early rice in Surat, Bajri, Maize and Groundnut elsewhere and the yield and quality of grain and fodder of these Kharif crops was below normal.

10. Good late rains were favourable for Rabi sowing but the heavy late rains delayed sowing as late as December in case of Wheat. Besides soil was not well prepared. This coupled up with mild winter and a touch of frost in February seemed to reduce the yield of Wheat, Rabi Jowar and Gram.

11. Tobacco was planted late in Kaira due to heavy rains and the consequent difficulty of raising seedlings. The crop therefore went to vegetation from the start due to September and October rains and heat and the result was the thin and light coloured mild leaf.

12. Katra attack in North Gujarat was mild due to light rains in July. Aphis appeared on cotton in Ahmedabad District and affected the crop to some extent.

III—Research and Experimental Work.

13. The work done by different sections is summarised under the following heads :—

(1) Research on Crop Breeding,
(2) Research on Crop Pests,
(3) Experimental Station Work,
(4) Experimental trials in cultivators' fields.

(1) Research on Crop Breeding.

Surat District.

14. *Cotton.*—Four Surat varieties were tested in ten random replications, each plot being 1·61 gunthas. The results are as under :—

Type.	Yield of seed Cotton per acre in lbs.	Ginning percentage.	Yield of lint per acre in lbs.	Highest suitable warp counts as spun by Matunga Laboratory.	Length of staple in inch.	Fibre weight in millionth of an ounce.
1	2	3	4	5	6	7
1027 A.L.F.	676	35·5	239·9	30s	0·90″	0·175
Surat 5[1]	623	38·4	239·2	25s	0·84″	0·171
I A Long Boll	688	39·9	273·8	28s	0·85″	0·172
White Flower	655	34·6	226·6	30s	0·92″	0·169

These results show that I A Long Boll yields highest lint and seed cotton, 1027 A.L.F. and Surat 5[1] are about equal in lint yield ; whilst the White flower yields the lowest lint. Yet these differences in yield of seed cotton are not significant between any two varieties.

15. *Crosses.*—The following important crosses are under study :—

(1) Goghari A—26 × 1027 A.L.F. in F^3 generation.
(2) 1027 A.L.F. × Jayawant in F^2 generation.
(3) I A Long Boll × 1027 A.L.F. in F^2 generation.
(4) White flower × Commilla in F^2 generation. Herbaceum
(5) Goghari E^5 × 1027 A.L.F. in F^1 generation.
(6) 1027 A.L.F. × (B.D. 8 × G.E.[5]) in F^1 generation.

16. *Selection work in cotton.*—No collection of local seed of cotton for selection has been attempted since the Science of selfing is known and therefore on the suggestion of the Deputy Director of Agriculture, Gujarat, samples of cotton seeds have been collected from all over the Surat tract including the States with a view to exploit the material for selection.

17. *Seed production.*—The Cotton Breeder, South Gujarat, Surat, produced 155·75 lbs. selfed seed and 615 lbs. pure seed of 1027 A.L.F. of which 144·5 lbs. of selfed seed and 615 lbs. of pure seed was supplied to the Surat Farm for Farm sowing.

18. *Jowar.*—Budh Perio 53 was grown for seed production only and 29·75 lbs. of selfed seed was produced out of which 19 lbs. was supplied to the Surat Farm for sowing.

Bardoli local seed was reported to be of better quality and equal in yield to Budh Perio 53 and it was confirmed by the trial on the Farm. Bardoli seed is of bigger size and heavier and was fairly pure for anther colour and shape of ear-head and selections have been made from this for further study.

Broach District.

19. *Cotton.*—To obtain a strain ginning about 40 per cent. and wilt resistant and spinning about 20s we have resorted to crosses.

Most of the crosses made uptil now were between B. 9[1] highly susceptible to wilt and Goghari strains partially free from wilt and very little success is obtained. Therefore at the suggestion of the Deputy Director of Agriculture, Gujarat and in consultation with Dr. Burns new crosses were made between B.D. 8 which is highly wilt resistant and spinning 32s with high ginning but wilt susceptible Goghari strains G.A.-26 and $G.E^5$.

The following crosses are under study :—

(1) B.D. 8 × G.A.-26 in F^2 generation.
(2) B.D. 8 × $G.E^5$ in F^2 generation.
(3) B.D. 8 × Commilla × Jaywant in F^2 generation.

(4) B.D. 8 × B.9[1] × Jaywant in F[1] generation.
(5) B.D. 8 × B.9[1] × Commilla in F[1] generation.
(6) (B.D. 8 × Commilla) × (B. 9[1] × Jaywant), in F[1] generation.

} Only few desirable plants are available and they will be studied.

20. *New selections.*—No. 10 is wilt resistant and high ginning and therefore fresh crosses have been made between B.D. 8 × N.S. 10 at Broach and 1027 A.L.F. and N.S. 10 at Surat and these will be grown next year.

21. *Rabi Jowar.*—Some new selections from Nicora sample and Sholapuri types are under study. No. 8 yellow another type is also under study.

22. *Replication tests.*—Nos. 10, 8 and 12 were compared with local in six replications. Local sample was composed of 8 samples collected by the District Agricultural Overseer, Broach. Area of each plot was 0·85 gunthas.

23. No. 10 a white grained variety being grown to a very limited extent will be dropped from further trials.

24. *Natural crossing in Rabi Jowar.*—The conclusions of last year that there is a natural crossing from 0 to 2·2 per cent. in North-Easterly direction within 10 yards may have to be revised as the off type plants reported to be natural crosses proved to be simply mechanical mixtures as evidenced by their progeny performance and the experiment is being tried again by selecting types that are similar in height and flowering period.

Kaira District.

Tobacco work at Nadiad.

25. *Replication trials on Dry Tobacco.*—Gandiu No. 6, local Gandiu Piliu 28, Piliu 45 and Local Piliu were replicated five times according to Fisher's random method. Each plot was of 0·62 gunthas which is rather small. The results do not show any significant differences in yield.

26. *Yield trials for Piliu Strains under irrigation.*—Piliu A, Piliu 45, Piliu 28 and Local Piliu were tried in six random replications but there was no significant difference in yield.

27. *Crosses.*—Two promising cultures from a cross of Gandiu 6 and Bhengi selected last year were grown in F[5]. These two are named as N-1 (Nadiad 1) and N-4 (Nadiad 4). Two strains, viz., N-1-5 and N-4-6 have been selected for further study. N-1-5 gives stronger tobacco like Bhengi and N-4-6 gives milder tobacco. Both are however late to mature.

28. One culture from a cross between Gandiu 6 and Adcock selected last year was grown in F[5]. This culture has been named as N-10 (Nadiad 10). Five plants have been selected for further study. The leaves of all these ripen as Adcock and suitable to harvesting by the method of

priming. They have nice smoking quality though stronger than that of Adcock. These also mature late and require further purification.

29. The cross between Gandiu 6 and Piliu 28 was studied in F^1 and will be studied further.

30. *Cigarette Tobacco.*—Attempts were made to grow thin leaf by leaving more leaves on the plant to get thin leaf and the results have been favourable.

Secondly new curing method was tried to obtain the proper yellow colour required for cigarette tobacco and a considerable success was obtained during the year. The tobacco of the 3 new crosses was cured by this new method and the tobacco was offered annas 5½ to annas 6 per lb. as against 2 annas per lb. for local when thoroughly dry. However the season was particularly favourable for their leaf and light colour and mildness, so it is to be seen if the results obtained this year will be confirmed next year.

31. The tobacco cured by new method was also made into cigarettes and the report of the smokers is as under :—

N-10 makes a strong smoking cigarette.

N-1 makes a very mild cigarette and it does not catch throat and can class as high quality cigarette.

32. Mixture of N-10, N-4 and N-1 gave highly satisfactory cigarette mild and good flavoured and does not catch throat and this compares well with some of the foreign types that are sold in local markets at Re. 0-3-0 per packet of 10 or annas twelve per tin of 50.

33. *Bajri at Nadiad.*—151 selections made last year were tested for their continuity of performance and attainment of purity under selfing and individual cultures are showing higher purity though no type is absolutely pure even for a single character. Few types show better performance than local. Some strains are early, some late and some are tall and the others are dwarf. It seems selections show deterioration as regards presence of red sheath, tillering and grain yield though straw yield has increased.

34. *Castor work.*—The Vina land being unsuitable, it was considered that Prantij might be a more suitable tract for castor work and the land was taken on lease and 8 big seeded and 4 small seeded varieties were tried with Kaira big seeded local and Prantij small seeded local as comparison respectively, for each group of big seeded and small seeded varieties. The big seeded were sown early as Kharif and small seeded late as Rabi crop, this classification was arbitrary. The spacing for early varieties was $4' \times 4'$ and for late varieties $3' \times 3'$. This spacing was based on the casual notes of observations on the growth of different varieties.

35. The yield results were not significant as the soil proved extremely variable. It has therefore been decided that the trials should in future be made on an even piece of land and all varieties be sown early and with wide and narrow spacing with a view to find out the best yielding type for each spacing. The trial is to be taken on Kamla Farm, Nadiad.

Ahmedabad District.

36. *Cotton at Viramgam.*—Wagad 8, B.B.M., C$\frac{1}{8}$ and Local were tested in five random replications, each plot being 1·93 gunthas. The results show no significant difference between any two varieties as far as the yield of kalas and seed cotton is concerned but when lint yield is considered Wagad 8 and B.B.M. give about 15 per cent. more yield over local and the results are significant; so Wagad 8 is the best as yet.

The fibre length of Wagad 8 was however shorter than local and Wagad 8 spun 16's whilst local spun 17's this year.

37. *Fresh selections.*—Out of the three selections mentioned in the last year's report only one selection F-S 26-2-1 is retained as it has as high ginning as Wagad 8 and the fibre is finer than that of Wagad 8. This selection has been sent for spinning test.

38. *Crosses.*—The following hybrids are under study :—

(1) Wagad 12 × B.D. 8 in F^1 generation.
(2) Wagad 8 × Taskant in F^3 generation.
(3) F^1 (Wagad 8 × 1027) × Wagad 8 in F^4 generation.
(4) Wagad 8 × 1027 in F^5 generation.

From the last cross 4 strains have been selected for high ginning and are being tested for spinning and are also being tested for yield. Five strains of wide opening bolls have been sent to Broach for trial.

39. *Jowar.*—During the year the survey to find out the prevalent types of jowar was made which shows that there are only two most important types, both are Kharif types, viz. Chhasatio and Utavli. The word Chhasatio has no relation to ripening in 66 days from sowing but it takes more than three months. 12 selections of Chhasatio type (9 being of green mid-rib and 3 of white) have been made during the year and 11 selections of Utavli type (9 of white mid-rib and 2 of green) have been made for further study.

(2) Research on Crop Pests.

40. *Katra control work.*—The work of Katra control was carried out on Kamla Farm, Nadiad, the results are summarised as under :—

(1) The monsoon unusually started late on 3rd July 1931 with a heavy shower of 2½ inches rain. The moisture depth was 6 inches and the first catch of moths per petromax trap was 157. The catch was highest after a week when the moisture depth was 11 inches. 93 per cent. of the total moths were entrapped in the first eleven days only. The emergence of moths from pupæ in the laboratory started by the end of first week of June, and successful rearing was done before the monsoon began.

(2) There were 7 petromax lights, 4 being in the inner zone 200' apart and 3 in the outer zone. The total catch of moths was 40,406 out of which 65 per cent. moths were from the outer zone only. It indicates that the entrapped moths had migrated from outside. This

as further confirmed from the pupal digs 5′ × 5′ on head-lands. 22 live pupæ could be had from 8 digs covering a total area of 200 square feet on the head-land. The whole area under head-lands was about 15,000 square feet which would not give on calculation more than 1,650 moths. While the catch of moths by light trap from the same area was 14,047.

(3) The females entrapped were 21 per cent. of the total catch out of which one-third were fully loaded and the rest were partially loaded. However the ratio of males and females in 130 moths that emerged out of three lots of pupæ collected and observed in the laboratory and in 117 moths hand collected from the fields was about 1 : 1. This observation requires further confirmation. If this represents the real situation in nature the lights do not seem to attract a large proportion of females.

(4) As the moths generally emerge from the pupæ in the evening and are inactive during the day-time, hand-collection of moths was done in two independent plots having an area of 2 acres and 1 acre 35 gunthas respectively for eight days. There was a total catch of 117 moths, 98 and 19 being obtained from the first and second plots respectively. The catch was made by the hand-collection of a total number of 32 boys employed during half days.

(5) In order to destroy newly hatched-out caterpillars on the grasses on head-land, sodium fluosilicate diluted with rice flour in proportion of 1 : 8 was dusted. It was observed that very few dead caterpillars could be found where the egg-masses were actually dusted and they could not be traced on the dusted head-lands. Dusting experiments were therefore conducted in the laboratory which showed that fully dusted leaves gave an average kill of 78 per cent. while the leaves brought from actual dusted head-lands killed 44 per cent. larvæ on an average. This requires further trial.

(6) *Trials to protect seed-beds by mechanical barriers.*—Mechanical barriers in the form of oil cloth, cellulose 9 inches height and painted sheet with and without a trench of 12″ depth were tried in the laboratory. Some of the small caterpillars that are very active could cross all the barriers without exception. The only promising barrier is of the galvanized non-painted sheet. It was repeatedly tried for 9 times and percentage of caterpillars that could successfully crawl over it was 2 to 12 per cent. only. The observations require further confirmation on a large scale specially on seed-beds.

(3) Experimental Station Work.

(*a*) *Surat Agricultural Station.*

41. *Season.*—The total rainfall was 53·38 inches. There was very heavy and continuous rainfall in July and August with short breaks in second and fourth weeks of July when sowing of cotton and jowar were finished respectively. In the last week of August there was a partial break permitting field work in the afternoon and the fields were cleaned

of weeds. Rains in September-October were normal. Long break in September permitted good cultivation. October rain was however bad for jowar. The soil however was too wet in September and up to middle of October and the crops did not make much progress up to the end of October. The winter was mild and the crops improved until the middle of February when cold dry easterly winds up to the end of February had brought about maturity of cotton.

42. The fields being kept free from weeds, the Cotton made up its growth in winter and the boll setting being late was free from boll-worm and succeeded better. 1027 A.L.F. yielded 682 lbs. per acre on an area of 48 acres. This yield is a record yield for this Farm. Cotton matured in time but Jowar was late by about a month and yielded 780 lbs. per acre on an area of 50 acres. During the season cotton crop outside the Farm was full of weeds and did not make up the growth and yielded about 300 lbs. and the crop of Jowar outside the Farm was about a third of the normal yield. The good Farm results are specially due to the good management of Mr. J. G. Naik, the Superintendent of the Farm, who did timely weeding and interculturing and kept the fields clean by utilizing the few short breaks in the season.

43. *Seed Multiplication—Cotton seed.*—1027 A.L.F. was grown on 48 acres and 14 gunthas giving 682 lbs. of seed cotton per acre. The cotton was rogued by the Farm staff and the Cotton Breeder, South Gujarat, Surat. 23,746 lbs. of 1027 A.L.F. seed was distributed in selected villages of the Surat seed groups for further multiplication and distribution to the respective group villages.

44. *Jowar seed.*—Budh Perio 53 was grown on 50 acres and 20 gunthas and 6,856 lbs. of the pure seed produced was distributed in the Surat tract.

45. *Variety trials.*—1027, Surat 5[1], Selection I A Long Boll and White Flower were tried in four replications, each plot being of 10 gunthas. These were not random replications.

Variety.	1027 A.L.F.	White Flower.	Surat 5[1].	Selection I A Long Boll.
Yield in lbs. per acre	546	583	620	643
Ginning percentage	36·26	35·84	39·35	40·34

All cotton have ginned more than last year even though last year's ginning was higher than usual. This may be attributed to sufficiency of water supply for the plants throughout the season.

46. *High Ridges V/s Low Ridges.*—This experiment was laid out to find out workable types of ridges for the cultivator. But high ridges were not prepared so long. During the year new difficulty was met

with. The end rows of two adjoining treatments did not leave equal spacing. Therefore the experiment has been dropped and new experiment has been planned instead.

47. *Manurial Experiments.*—The experiment described in paragraph 29 of last year's report was continued. The results are as under:—

Treatment.	Average yield per plot of 2·5 gunthas. Cotton grown on	
	Ridges.	Flat.
Control	34·17	36·17
20 lbs. mixed Nitrogen	44·4	41·7
20 lbs. Nitrogen as Sulphate of Ammonia ..	43·75	43·75
15 lbs. do. do.	42·72	44·75
15 lbs. mixed Nitrogen	42·77	36·72

In case of ridges the application of 15 lbs. and 20 lbs. of Nitrogen per acre, both as Sulphate of Ammonia alone and as mixed with ½ Nitrogen as Castor Cake, has given significant results over no treatment. For significance the difference must be more than 6·84 in case of ridge experiment, so there is no significant difference between application of 15 and 20 lbs. Nitrogen alone or mixed.

In case of cotton on flat the difference should be more than 11·02 between any two treatments and therefore the results are not significant; whilst last year 20 lbs. Nitrogen gave significant results over no treatment.

This experiment has been dropped as a new experiment has been designed to study the effect of application of Nitrogen as Sulphate of Ammonia at the rate of 10 lbs., 20 lbs. and 40 lbs., per acre.

48. *Residual Effects on Jowar.*—There is no significant difference between different treatments and so there is no residual effect of Nitrogen on the second crop.

Dibbling cotton on Egyptian method as described in paragraph 31 of last year's report.

Year.	Yield of seed cotton per acre.	
	Sowing 3′ × 3′.	Sowing in equilateral form 3′ × 2½′.
1930-31	605	551
1931-32	435½	378½

There were five replications of this trial and the results show that new method gives less yield. The replications were on A B, A B method.

49. *Miscellaneous trials*—(*a*) *Green manuring.*—Dhaincha seed was sown broadcast in the middle 2 feet space of cotton rows 6′ apart. 60 lbs. of seed was sown per acre. These strips gave 5 tons of green stuff per acre testing 0·43 per cent. Nitrogen. It grew 2½ feet high within a month. It stands lot of moisture at the root. It takes longer to rot compared with Sann but gives no difficulty. However it is liable to attract swarming caterpillar which ate away most of the leaves and shoots of cotton within a week. This may become a serious handicap in introducing Dhaincha as green manure crop.

(*b*) Striga resistant Jowar was grown in a field affected by striga and the variety proved resistant but the grain quality is too inferior for growing.

(*c*) *Jowar spacing and its effect on fodder and grain.*—Jowar was sown 2½ feet apart at the rate of 10 lbs. per acre. In one plot plants to be spaced were 6″ apart in the row and in the other one foot apart. But due to poor germination actual spacing was not obtained as required. So the results are rejected.

(*d*) *Four feet Drill and Harrow.*—People are sowing cotton 4 to 5 feet apart but they use 2′ or 2½ feet drill by closing one hole at the time and by making two turns. It was noted by the Deputy Director of Agriculture, Gujarat, that in some places there were 4 feet and 5 feet drills and sowing can be done at a stretch by using both the holes of the seed box and one can sow more area. The Farm used 4 feet drill and 4 feet harrow to cover without any difficulty and the work was increased by 50 per cent; so it is more economical and gives speed in sowing. However the drill and harrow used were made rather heavy and light implements will be tried again.

50. *Trial of Schutte's Drill.*—Cotton and Jowar yielded little more by improved drill, but the drill has some very serious drawbacks to be of any use in this tract.

1. It requires 210 lbs. draft as against 82 lbs. for the country drill.
2. Sowing is far too difficult even by good heavy pairs and it is far too slow to cope up with sowing within a short period and it may mean very late crop and poor crop or no chance for a crop in Surat tract.
3. The drill cannot be taken to the Farm in monsoon.
4. Besides price will be more. It is suggested that a simple drill on the pattern of local drill 4 feet apart may be fitted with regulating arrangement and the drill may be lightened.

51. *Surat Dairy.*—The strength of the herd on 1st April 1932 was 88 as against 133 of the last year, having 33 cows, 10 heifers 22 she-calves, 20 bull-calves and 3 premium bulls. The decrease is due to 32 animals being sold in auction, 21 bull-calves transferred to Chharodi Farm, 13 bulls sent out on premium system, 2 old bulls sent to Panjrapole and 4 bulls castrated and transferred to the Surat Farm. The

general health of the cattle remained fairly good except that there was virulent attack of foot and mouth disease in January 1932, which told upon the health and milk yield considerably. The after-effects in case of two cows were very marked. Both these cows became very weak and emaciated and their white colour changed to almost iron-grey. All the cattle except the Breeding Bull ALO who is bred from full brother and full sister, were attacked by this disease. There were five deaths during the year under report, one old cow having died of foreign body in heart, one calf died of accident and one of weakness and two of foot and mouth disease. There were 32 births as against 24 of last year, more due to seven heifers dropping first calf.

The total milk yield during the year was 89,557 lbs. as against 84,673 lbs. of last year. Annual average milk yield per adult cow was 3,088 lbs. for 29 adult animals as against 2,794 lbs. for 30·3 adult of the last year, excluding barren ones in both cases. The per cent. of dry animals to total adult was 23 as against 31 of last year.

The following cows are worth mentioning from point of good milk record during the year under report :—

Serial No.	Name of cow.	Name of family.	Lactation period days.	Milk yield in last lactation lbs.	Milk yield in first 300 days of lactation	Number of lactation.
1	Ailen ..	Anpurna ..	416	5,507	4,633	7
2	Iravati ..	Do. ..	239	4,709	4,709	6
3	Ashmani ..	Do. ..	264	4,145	4,145	3
4	Angira ..	Do. ..	406	4,615	4,034	2
5	Rukhi ..	Prayag ..	392	4,696	4,444	8
6	Rupa ..	Do. ..	293	4,428	4,428	4
7	Lakhi ..	Kashi ..	421	5,877	5,058	5
8	Rupali ..	Prayag ..	403	3,814	3,149	1

Total realizations from the Dairy produce during 1930-31 and 1931-32 were as under :—

Year.	Total milk yield in lbs.	Total realizations.	Quantity per rupee.
		Rs. a. p.	Lbs.
1930-31	84,673	8,518 13 7	9·939
1931-32	89,557	6,838 1 4	13·097

Less realizations in 1931-32 due to low rates for milk.

(*b*) *Dohad Farm.*

52. *Maize.*—The experiment to sow Maize with a plough 1 foot apart without thinning compared with sowing by a drill 18″ and 2 feet apart between rows and thinning at the distance of 9″ and 12″ between plants was done on both the soils, viz., Black and Brown in five random replications. On Black soil, the drilling at the distance of 2′ between rows and thinning either at 9″ or at 12″ between plants was significantly superior to the local system. Between drilling at various distances there is no significance.

On Brown soil, the drilling system either at 18″ or 2 feet both are significantly superior to the local method. There is no significance within various distances.

The results in Black soil for 2 feet distance between rows and 9″ apart between plants were superior by 38 per cent. while on Brown soil they were superior from 82 to 66 per cent.

53. *Groundnut.*—The Groundnut crops yielded on an average at the rate of 513 lbs. per acre owing to heavy rains.

54. *Paddy.*—Jiresal and Anklo varieties were grown on the Farm and yielded 2,080 lbs. and 1,100 lbs. respectively.

55. Sann green manuring combined with 22 lbs. Nitrogen (Sulphate of Ammonia) per acre for rice was more profitable than 10 cart-loads of Farm yard manure with 22 lbs. Nitrogen (Sulphate of Ammonia).

56. *Cotton.*—It gave an average yield of 648 lbs. per acre. Cotton gave larger profit than Maize and Gram.

57. *Wheat.*—Six Wheat varieties were grown during the year, out of which Wagia and Pisi yielded the best. This year Pusa 4 yielded rather lower than Wagia and Pisi. The Average yield of Wheat was 1,110 lbs. per acre.

In the spacing experiment of Wheat, the drilling has given better results than sowing with a plough, but there is no significant difference.

58. *Gram.*—In all about 24½ acres were grown under it and it gave an average yield of 513 lbs. per acre.

59. *Seed Distribution.*—During the year the following seeds were distributed :—

	Lbs.
1. Maize	9,078
2. Spanish Peanut	6,194
3. Pusa 4 Wheat	5,350
4. Gram	5,366
5. Jiresal rice	140
6. Anklo rice	415

(4) *Experimental trials in Cultivators' Fields.*

60. *Cotton.*—Wagad 8 was tried at different places and the results are as under :—

Taluka.	Number of trials.	Number in which seed cotton of Wagad 8 was more.	Number in which lint of Wagad 8 was more.	Remarks.
Dholka ..	3	3	3	Seed Cotton increased by 2 to 4 per cent. Lint increased by 4 to 15 per cent.
Viramgam ..	10	6	7	Seed Cotton increased by 6 to 14 per cent. Lint increased by 10 to 30 per cent.
Bavla ..	3	1	1	Seed Cotton and Lint increased by 5 to 8 per cent.
Dhandhuka ..	2	....	2	Lint increased by 1 to 2 per cent.

In three cases in Viramgam the yield of Wagad 8 (Seed Cotton) was low by about 20 per cent. and above. These crops were late sown and Wagad 8 does not seem to do well when sown late as Aphis checked the growth in all three cases. In Bavla too, yield was low by 15 per cent. Bavla local seed seems to be superior.

Ginning per cent. in Wagad tract varies a lot but Wagad 8 has shown higher ginning by 1 to 4 per cent. in all places except Bavla.

61. *Wheat Strain No.* 224.—It was tried in Viramgam Taluka near Chorvadodra and it yielded 12½ per cent. more than Local.

At Bhojwa it gave no increase in yield. Quality of grain was better than Local.

In Bhal tract at Tagadi, 224 was grown extensively but owing to lot of moisture in soil in the early stage of the crop the grains were spotty as they did not mature well before the crop dried up due to sudden drying of the soil at the end of the season. Even the colour of the grains was more brownish this year and hence inferior. However at Arnej centre where the same was grown extentively it fetched annas three more per maund of 40 lbs. and the grain quality was less spotty and better in colour.

In Broach District, 224 yielded better than Local by 14 per cent. The grains of 224 were as spotty as those of the Local type. Further trials necessary.

62. *Pusa 4.*—This was compared with Wagia in 3 plots, in Jhalod Taluka and Pusa 4 yielded more from 16 to 89 per cent. Pusa 4 was tried in Godhra Taluka in three places and it yielded more than the Local variety called " Tunkdi " by 26 to 46 per cent.

63. *Paddy Strains No. K.* 184 *and No. K.* 42.—K. 184 was tried in 5 plots in North Daskroi Taluka, at 4 places in Dholka, one in Prantij and one in South Daskroi Taluka.

In North Daskroi Taluka it yielded higher than Local by 3 to 6 per cent. but in one case by 26 per cent. In 4 places of Dholka, increase of yield was 26 to 53 per cent. In South Daskroi it yielded less by 8 per cent. whilst in Prantij increase in yield was only about 4 per cent.

K. 184 is less liable to attack in store and is earlier by a week. It has finer grains than 79 and has given good results in Dholka and can replace Sutarsal. K. 184 and K. 42 do not show much better yield than Local in Prantij. Further trials necessary.

K. 79 has been introduced in Surat in place of Local Kada. But lately some complaints have been received and so K. 79 and Kada were being tried in Bulsar Taluka. K. 79 suffered more from rain at harvest time by lodging. Kada yielded better than K. 79.

64. *Melons.*—Two varieties—Honey Dew and Orange Flesh were tried in Dholka but they were not as hardy as Local and fruits did not ripen well. Creepers dried up earlier.

65. *Groundnut.*—Magadi V/s Big Japan—Five successful trial plots were arranged at Kalol and Derol. The Magadi strain yielded more than Big Japan by 3 to 42 per cent. averaging at 24 per cent. increase.

66. *Sugarcane.*—Co. 213 is being taken up by the whole of Gujarat as very suitable hardy variety, requiring less water and able to stand heat and cold. However E. K. 28, P.O.J. 2878 and 2883 are under trial by one of the cultivators in Kalol Taluka. Co. 213 gives a good crop as ratoon and therefore ratoon crop was under observation. The ratoon crop in Surat District, yielded 4,316 lbs. gul per acre with 5 cart-loads of Sheep manure and 30 lbs. Nitrogen as Sulphate of Ammonia. This yield is 50 per cent. of the yield of plant cane. The crop had suffered due to heavy rains in monsoon.

67. *Jowar.*—In Broach District Rabi Jowar Nos. 12 and 8 were compared with Local. Two trials of No. 12 and one of No. 8 were complete as other three were cut as fodder due to bad season for grain crop. No. 12 yielded 6·8 per cent. more grain than Local, fodder yield being equal. No. 8 was equal to Local.

68. *Cultural Trials.*—At Tagadi and round about, Wagad cotton is sown 20″ apart. The holdings are large so it was advisable to sow wide to reduce cost of cultivation, if yield is not reduced. Wider sowing by 27″ drill was tried. The yield in 20″ and 27″ sowings were about the same.

Wheat in Bhal tract is sown 13″ to 14″ apart, it was compared with 18″ sowing in two places at Tagadi and in both the cases wider sowing gave 7 to 14 per cent. more yield and 10 lbs. less seed was required per acre.

69. *Kaira District.*—Preliminary trials for wider sowing of Bajri and Kodra were taken on small areas. Bajri and Kodra were sown 18″ apart V/s 12″ apart and wider sowing showed better yield. The trials

however were not on equal areas and on half acre plot in 3 or 4 plots in a centre which will be done in future. Cotton dibbled 3′ × 3′ gave better yield than sown 27″ apart. This experiment too, requires to be more thorough.

70. *Panchmahals.*—Sowing Maize by 18″ drill versus 12″ with a plough gave better yield by 8 per cent. in one centre in Dohad Taluka. Sowing Wheat 15″ versus 12″ with a plough increased the yield by 7 to 15 per cent.

71. *Manurial Trials—Ahmedabad District.*—50 lbs. and 30 lbs. Sulphate of Ammonia was applied to Jowar fodder in Dholka and 50 lbs. increased the fodder by 41 per cent. but 30 lbs. increased the fodder by 14 per cent. Application of 50 lbs. Sulphate of Ammonia just pays the cost and is worth adding if more fodder is needed on small holding. 60 lbs. of Sulphate of Ammonia was tried with Bajri in Prantij, it increased the grain by 5 to 29 per cent. but the cost was much higher than the grain. 112 lbs. of Sulphate of Ammonia was applied to Wheat in North Daskroi, it increased the yield of Local irrigated Wheat by 21 per cent. in the only one trial there was. This just paid the cost. In case of the manure to Pusa 4 the increase in yield was 7 to 11 per cent. and did not pay the extra cost.

Rice crop was manured with 112 lbs. to 140 lbs. of Sulphate of Ammonia which increased the yield in varying degree. In 10 trials it left profit, in other 10 cases the cost was not recovered and in three cases increase was equal to cost. It seems manure will yield better results in badly manured poorer lands and in advocating its use, lot of judgment has to be used. In 8 cases half the Sulphate of Ammonia was substituted by Groundnut cake which was equally cheap for Nitrogen content. Sulphate of Ammonia alone produced 18 per cent. more yield and mixture produced 11 per cent. more yield both leaving profits in that proportion. Further trials necessary.

72. *Kaira District.*—56 lbs. of Sulphate of Ammonia was applied to Bajri. In two cases it was applied in one doze and in other two cases in two dozes. In the first case the yield increased by 21 to 33 per cent. and in the other two cases by 45 to 73 per cent. which leaves some profit.

In case of Bavto 56 lbs. Sulphate of Ammonia increased yield in one village (Sandhana) by 28 to 72 per cent. in two cases whilst in another village by 9 per cent., and 15 per cent. hardly paying the cost in the second village where the crop was water-logged.

73. *Panch Mahals.*—112 lbs. of Sulphate of Ammonia to sown rice at Godhra increased the yield by nothing to 34 per cent. and on transplanted paddy increased the yield by 19 to 83 per cent.

10 lbs. Nitrogen as Sulphate of Ammonia to Maize increased the yield from 7 to 19 per cent. but Groundnut cake did not do so well.

56 lbs. of Sulphate of Ammonia to Wheat increased the yield by 12 to 22 per cent. just barely paying the cost.

74. *Broach District.*—16 lbs. Nitrogen as Sulphate of Ammonia was applied to Cotton after 1½ months which increased the yield by 15 per cent. which just covered the cost of manure.

IV—Organisation.

75. *Divisional Board.*—Two meetings were held under the Chairmanship of Assistant Registrar and two under that of the Deputy Director of Agriculture. The Board as usual watched the working of the Development Associations and the work of the Propaganda staff.

76. *Taluka Development Associations.*—There are six Taluka Development Associations in this Division. Five maintain their own Overseers.

The Overseers are planning their work in consultation with Local District Agricultural Overseer and send monthly programme and report to the Deputy Director of Agriculture. The Overseer of Chorashi Taluka Development Association failed to send any such programme and report. All Taluka Development Associations except South Daskroi have funds and work fairly well.

The old Agricultural Associations are existing only in name except the Broach Agricultural Association, which has been re-organised with a non-graduate Overseer. This Association publishes quarterly paper called the Broach Industrial and Agricultural Quarterly under the honorary editorship of Mr. A. K. Vashi, B.Ag., who has been doing this work very enthusiastically and ably.

77. *Agricultural Co-operation.*—District Agricultural Overseers try to work through Co-operative Societies the propaganda work but the Department is up against the general desire on the part of the Co-operative Societies to obtain material help before they agree to take up the work for the benefit of their members. Under these circumstances the Department finds it cheaper, easier and speedier to work through private individuals than through Co-operative Society. In Broach District the Co-operative Societies willingly offered to help to sell the plant pullers in connection with cotton Boll-worm Control Scheme but no one would buy from them as they wanted 2 annas more per plant puller whilst the Department sold about 7,000 plant pullers at Re. 1 each.

The Agents of the Co-operative Societies in Panch Mahals are distributing seed produced on the Dohad Farm and the societies help in growing pure seeds of groundnut and even maize for their use.

78. *Cotton Policy in South Gujarat.*—(*a*) As reported in paragraph 59 of the last year's report, 1027 A.L.F. grown on the farm was tested with I-A Long Boll (highly impure) grown by Olpad Societies as no pure I-A Long Boll was grown on the farm. Therefore the comparison cannot be taken to represent two pure cottons grown under identical conditions. This difficulty was felt by the Department which had already arranged to grow the two cottons side by side under identical conditions in various centres in the Surat tract as well as on the farm with a view to get representative comparable samples for spinning tests in the Matunga Laboratory as well as in the Mills as the real issue between

the two cottons lies in the difference in the spinning values to the Mills of these two cottons as the buyer pays on the spinning value of the cotton in the Mills.

(*b*) During the year the Department of Agriculture had laid out comparative trials of 1027 A.L.F. and Selection I-A in five centres in Surat District to find out the yield, ginning percentage and spinning results of both the cottons grown side by side so that the Department can decide on the most profitable cotton for the cultivator of Surat tract.

At all the centres the trials were taken in four separate plots except in Jalalpore where there were three plots. All the trials were in duplicate. Each individual plot was of 10 gunthas except where we had to cut down the plot to exclude irregularities. The seeds were dibbled 3′ × 3′ in all plots except in Jalalpore Taluka where seeds were dibbled 2′ × 2′.

The season was very wet in July and August and weeds were in abundance to check the growth. The crop was late and poor on the whole. The results may be summarised as under:—

In Ankleshwar and Olpad Talukas on the North of the Tapti I-A Long Boll yielded more than 1027 A.L.F. in 12 comparisons out of 16, the increase varying from 20 to 37 per cent. and 15 to 42 per cent. respectively. However in one comparison in Ankleshwar and in three comparisons in Olpad I-A Long Boll yielded less than 1027 A.L.F. by 8 to 12 per cent. Besides I-A Long Boll invariably gave higher ginning by 3 to 4 per cent. over 1027 A.L.F. In Jalalpore, Bardoli and Chorashi Talukas on the South of the Tapti I-A Long Boll gave more yield by 1·7 per cent. to 50 per cent. in 18 comparisons out of 20 and the ginning percentage of I-A Long Boll was more by 3 to 4·6 per cent. These trials in the cultivators' fields give clear indications that I-A Long Boll will yield at least equal if not more than 1027 A.L.F. and will give 3 per cent. more ginning.

(*c*) *Spinning Tests.*—Samples from each trial (consisting of two replicates) have been sent to the Matunga Laboratory for spinning tests. This will show how each variety fares in different plots in each centre as well as in different centres.

Besides, the collective samples from the mixed lint of all the trials on the North as well as on the South of the Tapti have been made into two lots to be tested by two Mills in Ahmedabad. Sheth Kasturbhai and Sheth Naranlal Jivanlal have kindly agreed to test these samples and the results are awaited.

(*d*) 1027 A.L.F. and I-A Long Boll were also grown on the Surat Farm on sufficient area to give few bales of cotton for comparative Mill tests. One set of bales of each of these two varieties was sent to the Spring Mills, Bombay, and the Textile Mills, Bombay, for Mill tests. These bales were also sampled by the Matunga Laboratory to test them there to compare the Mill tests with Laboratory tests.

(*e*) Whilst the District trials were being carried out by the Department of Agriculture, the whole question of Cotton Policy was put before the Indian Central Cotton Committee, for their opinion at their 23rd Meeting held on 13-14th July 1931 and they decided by their resolution 20 " that

the case be sent back to the Director of Agriculture, Bombay, with the request that he will lay down comparative experimental plots of 1027 A.L.F. and I-A cotton on—

(*a*) experimental farms,

(*b*) the lands of representative holdings of ordinary cultivators scattered throughout the area under consideration,

(*c*) that notes of purity of type, size and shape of the plots, repetitions and other data which will help new interpretations of the results be noted,

(*d*) this experiment to be carried out for two years and reported on to this Committee along with the spinning tests of fibre from the experimental plots and with the results of past tests.

* * * * * *"

According to this resolution the trials are being taken during the coming season in five centres, only change from the trials reported above being that each trial is to consist of five replications instead of two and each replication being of 8 gunthas instead of 10. Besides the sowing is to be done according to the local practice.

79. *Cotton Transport Act.*—The working of the Cotton Transport Act in the Surat tract is far from satisfactory, there being no control on road and river transport of cotton from one zone into another and from the Narbada-Mahi zone into Surat zone.

80. Cotton seed from the North of the river Narbada has been brought into South at various ferry places on the bank of the river. This Goghari seed was grown on about 3,500 acres in the villages of the bank in Ankleshwar and by the help of the local gin-owners and by opening seed-depôts and persuation the area under Goghari has come down to about 400 acres; as yet some of the gin-owners mix all this cotton into others and seed goes back, also some merchants get the seed cotton ginned for seed distribution.

81. During the current year it was also detected by the Department that large area was under Goghari in Navsari tract. The gin-owners of Navsari being not keen to exclude it from the tract were actually buying the Goghari cotton from all over the tract by paying higher prices for adulterating it with Surat cotton to pass it off as Surat cotton not caring for the reputation of the Navsari cotton. As a result of this the prices of Navsari cotton have fallen below Bardoli but gin-owners do not stand to loose as they will pay less to the cultivator.

82. The Local Cotton Trade Committee consisting of commission agents and gin-owners agreed to drive out the Goghari by paying less price and ginning it separate but this paper resolution was never carried out by the gin-owners and unless there is some control on the gin-owners and merchants full benefits of Cotton Transport Act cannot be obtained by the farmer or the mill-owner. However the Department of Agriculture is trying its best to persuade the people to sow pure 1027 A.L.F. seed instead of Goghari mixture. The Department of Agriculture, Baroda State, has been working in full co-operation with the Department of Agriculture, Bombay Presidency.

V—Propaganda.

83. *Seed Multiplication and Distribution—Cotton seed of 1027 A.L.F. in Surat District.*—During the year the Cotton Superintendent, Surat, and three Graduate Assistants of the Department and one Graduate Assistant and one non-graduate Assistant from the Indian Central Cotton Committee's funds were looking after the work of seed multiplication and distribution. 14,999 acres were grown under 1027 A.L.F. in four groups. 23,746 lbs. of Farm seed was sown in selected villages of each group and the resulting seed was distributed to the rest of the villages in each group. 5,256 Bhars of seed cotton was ginned at six centres and 1,982 Khandis of lint was obtained. Out of the total quantity of seed, viz. 2,255,918 lbs. obtained from the group areas, 723,045 lbs. was distributed in the group villages through 20 Depôts and 1,532,873 lbs. was supplied to adjacent Indian States including Rajpipla, Chhota-Udepur, Jambughoda and Baroda. In addition to the abovementioned quantity of seed 202, 350 lbs. of seed was purchased from non-controlled area and supplied to Rajpipla State to meet unexpected demand.

84. *Tobacco Seed.*—55 lbs. and 12 ozs. of Piliu 28 and 129 lbs. and 12 ozs. of Gandiu 6 were supplied to Kaira and other parts of the Presidency.

85. *Groundnut.*—9,138 lbs. of Spanish peanut seeds were distributed in Panch Mahals.

86. *Wheat.*—5,320 lbs. of seed Pusa 4 were distributed in Panch Mahals. 24,500 lbs. of wheat strain 224 were distributed in Bhal tract through the private agency of a leading Talukdar Mr. Takhatsingji of Tagadi and the Trustees of Arnej Inami village.

87. *Sugarcane.*—Co. 213 is being spread in Panch Mahals, Kaira, Ahmedabad and Surat. 504,000 sets were distributed in Panch Mahals, 187,200 sets were sent to Kaira and Ahmedabad, 40,000 sets were distributed in Pardi Taluka of Surat District. Besides cultivators of Panch Mahals, Bulsar and Chikhli Talukas have obtained the sets of Co. 213 from their neighbours.

88. *San Seed.*—20,040 lbs. of San seed was supplied to the cultivators of Broach for green manuring purposes. In Broach there is a practice of partial fallows and San green manure is used either as a raw crop between cotton or as a whole crop to be buried and if rains are suitable Rabi Jowar is taken where San is not mixed with cotton crop.

89. *Suran, etc.*—18,000 lbs. Suran, 900 lbs. Ginger, 800 lbs. Yams and 150 lbs. of turmeric set were supplied by the District Agricultural Overseer, Bulsar.

90. *Fruit Plants.*—During the year 1,600 plants of Mosambi, 224 plants of Chikoo and 200 plants of figs and 25 plants of seedless guavas were supplied gratis to the selected cultivators of Anand, Nadiad, Borsad and Kapadvanj Talukas with a view to introduce fruit plantation on deep wells of Kaira as tobacco crop is loosing ground on account of its very low price.

In Broach District 1,185 plants of lemons, guavas and mangoes were supplied.

91. *Manure Distribution.*—As the Imperial Chemical Co. have opened propaganda and selling agencies in almost every district the cultivators are advised by the district staff to obtain their manure supplies from these agencies.

92. *Implement Distribution.*—Twelve Kirloskar ploughs and 24 Cooper's ploughs (No. 27) were distributed in South Daskroi Taluka. Two Meston ploughs, 12 shares, 12 Sultan cane crushers, 2 Chatnooga power crushers and 7 Poona type Gul boiling pans and 15 Persian wheels were supplied in Panch Mahals. 265 cotton plant pullers, 3 Persian wheels and 4 harrows were supplied in Broach District. One winnowing fan and 10 cotton plant pullers and 36 Peerless dusting machines with 14 tons of sulphur for dusting mango trees against mangohoppers were supplied to the cultivators in Bulsar and Pardi Talukas.

93. *Demonstrations and Shows—Sulphur dusting on mangoes.*—The old type general demonstrations and shows have done their work of educating the public and creating interests in agricultural problems of the tract. Now is the time for specific demonstrations to convince the individual farmer of the advantages of the specific recommendations made by the Department and to show him how to take full advantage of it. With this view in mind small demonstrations on sulphur-dusting of mango trees against mangohopper or "Madhia disease" caused thereby were carried out by the District Agricultural Overseer, Bulsar, and the Entomological Assistant, Surat, in Bulsar, Chikhli, Chorashi and Ankleshwar Talukas of Surat District. Besides the Overseers of the Taluka Development Associations, Jalalpore and Pardi, carried out similar demonstrations in their charge in consultation with the staff of the Department. In each centre at least 50 trees were dusted and it was demonstrated that blossoms should be dusted uniformly all over the trees. Two dustings were done one from 17th to 31st of January 1932 and the other from 4th to 15th of February 1932. The quantity of sulphur used averaged at 2 lbs. and 1 lb. for the first and second dusting respectively. The sulphur was provided by the owners of the trees. The people were shown that the dusted trees had good bearing, the some undusted trees had very poor bearing.

In Broach District nine small demonstrations were held during the year. There were four demonstrations on San green manuring and showing burying San by Malwa plough. Two demonstrations to show use of B. T2 and C. T2 ploughs, three demonstrations were held for showing the use of Arsenic against rats.

In Panch Mahals six practical demonstrations for Gul making by improved method were held in Halol and Kalol Talukas. On Dohad Farm the demonstrations to show how to use seed drill was held for three days and 90 leading farmers of Jhalod and Dohad Talukas took advantage of it.

In Kaira District the demonstration for making lime-juice and bottling it and making guava jelly was held at Anand and 200 people including the students and the cultivators took part in it.

Sulphur-dusting on Jiru against Jiru Mildew was demonstrated at Lambhwel and all the cultivators of the place were shown how to dust

and the cost of dusting, etc. Small party demonstrations were held at Sandhana near Nadiad to show the advantages of wider sowing of cotton, Bajri and Kodra and many people have gone in for wider sowing.

94. *Short Horticultural Class.*—To introduce fruit cultivation in Kaira District horticultural class for a week was held at Anand in the grounds and buildings of the Dadabhai High School with the help of the Horticulturist to Government of Bombay, Poona. The Head Master of the High School allowed the full use of the garden and the buildings for the class. This class was held at the end of October 1931. 143 students took advantage of the class and at the end 85 people appeared for examination and 76 passed and were awarded certificates. Fifteen rupees and two Secatures were given as prizes by the Borsad and Anand Taluka Development Associations respectively. The cultivators showed great interest in the subject. The big attendance was due to the enthusiastic interest of the Head Master of the High School and the activities of the Overseers of Borsad and Anand Taluka Development Associations.

In Dholka growing of 224 wheat and the manuring of rice by sulphate of ammonia was demonstrated to a number of cultivators in the district. Generally all the successful trials in the cultivators' fields are demonstrated to the cultivators of the locality and round about with a view to further propaganda and spread of the improvement.

95. *Cotton Boll-worm Control Scheme.*—As reported in paragraph 70 of last year's report the scheme was launched in Broach, Wagra and Amod Talukas. The Cotton Entomologist and four Boll-worm Control Officers with the help of Kamgars carried out the educational propaganda up to the end of January 1932. Later on there were two Boll-worm Control Officers and six supervisors. The work of these staff consisted of the following items :—

(1) Growing cotton plants free from cotton boll-worm by night caging with mosquito net in comparison with no protection, for demonstrating the advantages of increased yield and early crop by protection.

(2) Explaining to the cultivators of the area the nature of the pest and the damage done to the crop of cotton.

(3) Magic lantern lectures for explaining the necessity and advantages of the clean-up measures.

(4) Persuading the cultivators to purchase the plant pullers to up-root cotton plants as soon as cotton picking is over.

(5) Arranging small demonstrations at local fairs.

(6) Arranging meetings of leading cultivators to enlist their sympathy for the scheme.

Item 1.—Few cotton plants were protected from boll-worm at 37 centres scattered in the area with one Kamgar in charge of each centre. The use of mosquito net for protecting the plants at so many places attracted the attention and curiosity of many cultivators who were explained why such costly work was necessary to show the advantages of freeing the cotton plant from the boll-worm pest. All except 21 centres were dropped

at the end of January 1932 as the scheme was made applicable to 480 square miles west of the Broach, Amod Railway line including only 125 villages instead of 212.

The final yield results of 21 centres though showing the yield of few plants in all cases (except three centres where 50 plants were protected) confirm the estimate that an increase of at least 25 per cent. in the yield of Kapas was likely to be realized by destroying the pest in the tract.

Item No. 2.—Cultivators were shown the pest in various stages and the actual damage done to the plant, flowers, buds and bolls of cotton plant. This formed an important part of the work for all staff including Kamgars during the month of November and December 1931.

Item No. 3.—Magic lantern lectures were arranged at 108 different villages and these attracted a good audiance in the villages and the people were fully acquainted with the clean-up measures. At these lectures cultivators were requested to register their orders for plant pullers for up-rooting cotton plants and requisitions for 1,800 plant pullers were received.

Item No. 4.—Serious attempts were made to sell plant pullers to the cultivators since the 1st of April 1931 when arrangements were completed for the supply of plant pullers by the Deputy Director of Agriculture, Gujarat, with the proprietor of Sayaji Iron Works, Baroda, at Re. 1-4-0 each. The Cotton Entomologist had designed the plant puller after the pattern of one secured from Coimbatore ; few of these were tried by him on the Surat Farm and in Broach District to invite the criticism of the cultivators and others. Serious defects were soon noticed and radical changes were made at once before final model was made and approved by the cultivators.

The staff was able to sell 6,815 plant pullers at Re. 1 each at a concession of annas seven including transport charges.

Item No. 5.—Shows were held at Shukaltirth and Zanor fairs and about 1,400 people saw the exhibits.

Item No. 6 was the most important part of the propaganda. The Deputy Director of Agriculture, Gujarat, saw the then Collector Mr. Mirchandani and explained the plan of our work and requested him to call a meeting of all the leading cultivators, members of the local board, revenue officers and co-operative workers and others likely to help the work and meeting was held on 22nd December 1931 and about 100 leading gentlemen and officers attended the same and great interest was shown in the work. The Deputy Director of Agriculture, Gujarat, explained the whole scheme at length and invited criticism and replied to all. The Collector recommended the scheme to all present and instructed all revenue officers to help the work which is likely to add to the profits of the tract by 25 per cent. without any extra cost to the grower.

Fortunately the use of plant puller costs nothing more to up-root the stalks than Kudali and the cultivators get great advantages in smooth and quick operations of sowing and harrowing which saves 25 to 50 per cent. in the cost of sowing and harrowing and causes no breakage. This pays for the plant puller in one season.

After this other meetings were held at taluka headquarters and the staff formed informal local village committees to push the work. As a result of intensive educational propaganda for 14 months the cultivators used 6,815 plant pullers to up-root cotton stalks and out of 79,719 acres under cotton 60,196 acres were up-rooted by plant pullers by the end of June 1932. However 17,250 acres of cotton plants were hacked out by Kudali and 412 acres of cotton were left standing. Unfortunately the success of the scheme is to be judged by the area left out or cut out in a way that will cause sprouting as soon as there is rain. Even up-rooting should be done by the end of April or middle of May if we are to control the pest. In doing this however the big landlords are the real difficulties as in this depression these landlords wish to retain old rents and the land remains unleased up to the last and the cotton stalks remain standing. Besides this there are few farmers who will believe up-rooting is not for the good of the land as they believe it keeps the soil loose or manure is lost, though the cotton stumps left in the soil do not rot even for two years and cracks that loosen the soil feet deep do not do any harm but does good. Thus there is nothing in these ideas and it is a question of time for these people to fall in line with the rest.

VI—Agricultural Services.

96. *Jowar Smut Control Work.*—The district staff had distributed the following packets :—

	Cuso 4 packets.	Sulphur packets.
Dholka	64	80
Viramgam	125	80
Broach	200	1,200
Panch Mahals	..	200

97. *Supply of premium bulls from Surat dairy.*—Thirteen bulls were supplied in non-breeding zones of Surat and Broach districts.

98. *Pest control.*—The Entomological Assistant, Surat, attended to many querries on the subject by personal visits and advice in control of pest. He also helped to control rats in Broach and Panch Mahals by distribution of 500 and 200 packets of white arsenic respectively. In addition 420 packets of Strychnine and 396 of Arsenic poisons were used for destruction of jackals and rats respectively in Surat district.

99. *Mechanical help.*—The mechanical assistant, Surat, attended to 16 applications out of 19 made for mechanical advice and help. He erected two pumping plants in Gujarat and inspected 11 pumping plants to advise the owners on repairs. During the year he was loaned to Thana district for erecting 19 B. H. P. oil engine and 6" pump which took three months.

A wire winding machine was designed by him at the suggestion and guidance of the Deputy Director of Agriculture, Gujarat, for cheapening the making of wire rings for selfing cotton flowers. He has also prepared drawings to make a cutting machine to cut rings and it is hoped he will prepare one such machine in near future.

100. *Horticultural Work.*— One non-graduate assistant was on duty in Kaira to carry out the proper planting of fruit plants given gratis to the cultivators of Kaira district. He has also been watching these plantations and others from time to time with the help of the local overseers of Anand and Borsad Taluka Development Associations and the Kamgar of Kaira district.

101. *General Advisory Work.*—The District Agricultural Overseers and Inspector of Agriculture and Cotton staff of Surat have been approached for advices regarding improvement of lands and introduction of new garden crops, etc.

VII—Educational Work.

102. The district staff has been inspecting Agricultural Bias Classes attached to the primary schools in this division and have been conducting their examinations. They also conduct examination of the vernacular final with agricultural bias.

VIII—Publicity.

103. "Broach Industrial and Agricultural Quarterly" is being supplied with articles. The department is buying 500 copies of this journal. "Gujarat Patrika" too was being supplied with articles and notes on agricultural matter. Numbers of leaflets have been translated into Gujarati.

IX—Miscellaneous.

104. The staff with few exceptions worked satisfactorily.

B. S. PATEL,
Deputy Director of Agriculture,
Gujarat, Surat.

Surat, the 13th August 1932.

Programme of work to be done under the Deputy Director of Agriculture, Gujarat Division, for the year 1932-33.

I. Research.

(*a*) Cottons.

Surat.

1. Evolving a variety that will gin higher than 1027 A.L.F. and will spin the same by studying various crosses on hand.

2. Attempting to improve spinning of 1027 A.L.F. by selection or crosses.

3. Fresh selection from a new collection of seeds from the tract has been specially suggested by the Deputy Director of Agriculture, Gujarat, as the Department did not do selection work since selfing has been introduced.

4. Multiplication of pure and selfed seed of cotton.

Broach.

The work will consist of evolving a high ginning, good staple cotton and wilt resistant by selection or by study of various crosses and making new crosses if necessary.

Viramgam.

1. Maintaining pure strains.

2. Multiplication of seeds of Wagad 8.

3. Study of 5 hybrids between 1027 A.L.F. and Wagad 8 that have high ginning and spinning qualities for yield in comparison with local.

4. Studying effect of wider spacing, viz. 24″ vs. 18″ with a view to reduce cost and increase yield by clean farming.

(*b*) Jowars.

Surat.

Maintaining pure strains. Selection from Bardoli jowar.
Multiplication of pure seeds of jowar.

Viramgam.

Selection work to obtain a strain from two local fodder varieties giving higher yield of fodder along with grains.

Tobacco work at Nadiad.—The Tobacco Breeder, Nadiad, is working on the evolution of a strain suitable for cigarette tobacco and the methods of growing and curing the tobacco for cigarette are under study.

Selection work in tobacco too is to be continued for obtaining a better strain than Nos. 6 and 28 for local market.

Bajri work at Nadiad.—Selection work to obtain a strain that will suit for grain as well as fodder will continue.

Castor work on Kamla Farm.—Twelve varieties of selected strains of castor are under replication trial for finding out the best.

Surat Farm.—The seed multiplication work for cotton and jowar for Surat tract will continue. Besides the manurial experiment to continue the research left by the Cotton Physiologist are on hand to find out the best way and amount of sulphate of ammonia to be applied to cotton for economic increase in yield.

The Farm is investigating the best method of obtaining successful stand of cotton, by modifying the old ridge method of cultivation.

Spacing Experiments are also on hand to find out the best spacing in Cotton.

Preliminary trials on green manuring of cotton land by growing Dhaincha or Ikad to increase the fertility of land to get better yields of cotton and Jowar are on hands.

Surat Dairy herd of best Kankrej milch animals will be maintained and bulls will be given out as Premium Bulls.

Broach Farm.—The Farm will carry on the selection work from the Local Wheat seeds and Rabi Jowar seeds to obtain better yielding strains.

Also experiments are on hand to improve the yield of cotton by cultural and manurial methods.

Dohad Farm.—The Farm is devoting itself to the work of producing pure seed of Spanish Peanut, Maize, Pusa 4 Wheat and other seeds for distribution in the tract where Bhils never store their seeds.

Besides the Farm is holding demonstration classes to introduce Drill sowing and interculturing for Maize and Wheat crops of the tract.

Propaganda.

Surat.

1. The comparative trials of 1-A and 1027 A.L.F. are laid out at five centres and will be studied to decide on one variety for the tract.

2. Control of seed multiplication of 1027 A.L.F. at four group centres and distribution of the resulting seed in the tract.

3. Checking the spread of Goghari in Surat tract by keeping vigilant watch over the movement of cotton seed from across the Narmada, by persuading the grower to go in for 1027 A.L.F. and by persuading the gin-owner to discourage the ginning of Goghari in Navsari and Ankleshwar Talukas.

4. In Garden areas the propaganda against mango-hoppers by sulphur dusting and cutting of loranthus will be followed very intensively.

5. Spread of Co.213 Sugarcane the best variety so far known in Surat tract.

6. Advocating proper manuring of fruit trees, rice and Sugarcane.

7. Trial of new strains of rice suitable for the tract.

8. Spread of clean up-measures for controlling Cotton Boll-worm.

Broach.

1. Trial of new strains of Rabi Jowar Nos. 8 and 12 with Local.

2. Advocating use of green manuring of Sann.

3. Introduction of small varieties of Groundnut in lighter soils as a rotation crop.

4. Propaganda against Jowar smut by distribution of Sulphur packets.

5. Control of Boll-worm by intensive work in Western parts of the district and spread of clean up-measures particularly the use of Plant pullers in other cotton areas.

Kaira.

1. Seed distribution of Tobacco Nos. 6 and 28.

2. Trials of wider sowing for Bajri, Kodra and Cotton.

3. Manurial trials of Bajri, Bavto and Kodra.

4. Demonstration of dusting sulphur on Jiru against Mildew.

5. Horticultural advice to growers regarding the improvement of the methods of growing fruit trees.

6. Introduction of new fruit plants such as Mosambi, Figs, Chikoo, etc.

7. Holding Horticultural Class.

Panch Mahals.

1. Spread of Co.213 and better cultivation on wider ridges and manuring of Sugarcane.

2. Introduction of Punjab Persian Wheels, Cane crushers, better type of furnace and gul pans and teaching people to make better gul.

3. Advocating the use of Sulphate of Ammonia for rice seedlings and rice crop.

4. Trial and introduction of Magadi type of a big Japan Groundnut in the suitable areas.

5. Spread of pure Spanish peanut, Pusa 4, Farm Maize seed, etc., in Eastern parts.

6. Wider sowing of Maize and Wheat in Eastern tract.

7. Control of smut by intensive distribution of Sulphur packets.

8. Destruction of animal pests by distribution of Arsenic.

Ahmedabad.

1. Trial of Wagad 8 vs. Local.

2. Multiplication of seed of Wagad 8 in Viramgam Taluka.

3. Trial of wider sowing of cotton for reducing cost of cultivation and for increasing yield.

4. Trial of wider sowing of Wheat.

5. Introduction of Sugarcane Co.213 and improved methods of growing it.

6. Trial of new suitable strain of Wheat such as 224, 809 and of rice 42 and 184.

7. Advocating application of Sulphate of Ammonia to rice seedlings and rice crop.

8. Manuring of fruit trees by Bone-meal and denatured salt.

9. Introduction of Basari plantain, Mango grafts, Seedless Guavas, Chikoo, Mosambi, Budded Lemon and Bor budding.

10. Study of spread of Kamodi disease in best rice of Ahmedabad.

11. Control of Grass-hoppers in Wheat tract.

12. Advocate, preserving seeds by the use of Carbon bisulphide.

13. Intensive propaganda to control smut in Jowar by sulphur treatment.

14. Trial of Norag for Wheat threshing.

15. Trial of chaff-cutter in Dhandhuka tract to save fodder.

16. Introduction of light plough for preliminary rice cultivation in Ahmedabad tract and supply of spare parts.

In addition all the District Agricultural Overseers have many trials of improved item of new seeds, manures, cultural methods, use of harrows, ploughs and straight blade for Broach harrow and inspection of Bias Classes and examining them and guiding Taluka Development Associations and advising on Agricultural matters.

B. S. PATEL,

Deputy Director of Agriculture,

Surat, the 30th August 1932. Gujarat, Surat.

APPENDIX G.

Summary of work done under the Deputy Director of Agriculture, Konkan Division, Ratnagiri, for the year 1931-32.

Staff.

Mr. V. V. Gadgil continued to be in charge of this Division throughout the year till 1st April 1932, when the Konkan Division was split up and the four districts were divided among the S. D., S. C. D. and N. C. D. The staff of this Division consisted of—

15 Graduate Assistants.

12 Non-graduate Assistants.

5 Kamgars engaged for propaganda work.

Each district was provided with 2 Graduate Overseers and 3 or 4 Non-graduates or Kamgars according to the necessity. During the year, the post of the Entomological Assistant was retrenched and one post of the Graduate Overseer was discontinued from 1st April 1932.

The work of the Konkan Division is summarised under the following heads :—

I. Research Work.

II. Propaganda Work.

III. Agricultural Organization.

IV. Agricultural Education.

Season.

2. This was the year of abnormal rainfall as the total fall recorded in each district exceeded the average by 25 to 50 per cent. The rainfall of the 4 districts was as follows :—

		Normal rainfall.	Inches in 1931-32.
Kanara (Karwar)	..	118	142
Ratnagiri	..	96·69	151
Kolaba (Alibag)	..	85·29	100·58
Thana	..	97	132

In Kanara District regular monsoon commenced on the 10th of June 1931 and in a fortnight 30 inches of rainfall was recorded. In July 1931, heavy fall of 72 inches was received without any break. In the months of August and September there were heavy floods which caused damage to low-lying rice fields. The fall of October was normal but the unexpected late rains of November interrupted the harvest of rice and the straw was spoiled. The mature grain began to sprout. In the Ratnagiri District the first shower was received on the 7th of June 1931 when rice

was sown in seed-bed area but the long break of 10 days was harmful to the young seedlings. The sowing of rahu (sprouted rice) and hill crops was delayed till the end of June 1931. In the month of July the fall of rain was so heavy that several rice fields were washed away. In Rajapur, Malvan and Devgad talukas heavy floods damaged the fields, houses and moveable property worth about 2 lacs of rupees. Normal rain was recorded in August and first fortnight of September but the heavy rains by the end of September spoiled the early rice crop. The months of October and November 1931 were too wet to allow the harvest of rice. In Kolaba and Thana districts monsoon set in very late and the first rains were hardly sufficient to grow seedlings. The regular monsoon commenced early in July and heavy showers were received without any break till the first week of September 1931. This was unfavourable for tillering of rice. The fall in the month of October prolonged the harvest and as a result the yield of rice was considerably reduced.

3. No insect pest of serious nature was observed during the year under report and the koleroga disease was also not very serious. But the trouble from pigs, jackals, cats and rats continued to be a standing grievance to the cultivators.

Effect of season on crops.—In Kanara District, the rice crop was valued from 8 to 10 annas and the spice gardens suffered heavily due to abnormal rain and yielded only 6 annas crop. In Ratnagiri, the yield of rice varied from 6 to 8 annas as both the early and late crops were damaged by rain. In Kolaba and Thana districts the rice crop was estimated at 9 and 10 annas respectively. Owing to the prolonged nature of rain mango trees put forth profuse leafy growth and it was found that the crop would be very poor but the continuous cold weather in the months of December and January produced better flushes and the crop was almost normal. The attack of mildew and hoppers was not very serious but when the crop was ready, the prices for mangoes ruled low on account of the riots in Bombay and the high expectation of mango planters could not be fulfilled.

General Depression.—There was a general depression in every kind of business and it affected the rural population to a large extent. It has become extremely difficult to obtain adequate finances, as the money-lenders practically stopped to advance loans on the security of crops. As a result the cultivation was more or less neglected. The heavy floods and untimely late rains added to the evil and the cultivators had very little credit with the Sawkars or co-operative societies. The cultivators received very low prices for their produce and they had no other alternative than to fall victim to the village merchants. The Government tried to improve their position by postponing the dates of payments; but all hopes of better prices were frustrated till the end of June 1932.

I—Research and Experiments.

(1) *Rice.*

4. *Rice Breeding and Selection.*—The work mentioned on page 164 of the last year's report was continued. At Ratnagiri the early strain Patni No. 6 has given increased yield from 14·9 to 23·1 per cent. over the local Patni during the last 3 years in replications. Hence no further trials are necessary. This strain will now be multiplied in the district. Kudai No. 25, another early strain, has also given increased yield from 9 to 18·5 per cent. over the Local Kudai or Patni varieties by the Fisher's method and is suitable for slightly lower situations. It has got high tillering capacity and the results are significant. The village trials of this strain are also encouraging and people have appreciated this strain. This will be propagated on the Farm and introduced in the coastal belt of Ratnagiri District.

Among the intermediate strains, Panwel No. 61 and Waksal No. 207 were tried in 8 replications. The former has given increased yield from 15 to 18 per cent. over the local check and has got finer grains. The introduction of this strain has been already commenced. About 2,500 lbs. of pure seed of Panwel No. 61 is preserved for distribution. Waksal No. 207 is still to be tested against Panwel No. 61 to ascertain which of the two is superior. Among the Bhadas selections, strain Nos. 79 and 92 were tried in 6 replications by the Fisher's method and they have given 18·2 per cent. and 4·4 per cent. increased yield over the local check, hence further trials are necessary to come to definite conclusion.

Among the late strains, *Varangal* Nos. 420, 448 and 487 were tried at Sakharpa plot by Fisher's method in 6 replications and all of them have given significant increased yield from 14 to 22 per cent. over the local check but further trials are necessary to find out the most suitable strain.

An attempt to cross between Kolamba No. 79 and Patni No. 6 was successfully made and about 96 cross seeds were obtained which will be tried in the coming season.

At the Kumta Farm, the work of selection was restricted to 4 important varieties viz. (1) Maskati, (2) Halga (white grain), (3) Halga (red grain), (4) Samsal according to the minutes of the Crop Research Committee. The Maskati strain Nos. 1012, 1315 and 1061 were tested by Fisher's method in 8 replications and have given from 13·5 to 22·2 per cent. increased yield and the results are significant. These will be tried again. From 19 bulk samples of white kerneled Halga, 140 individual plants are selected in this season. Out of the 5 strains of Halga (red kernel), strain Nos. 244, 1501 and 1548 appear to be promising as they have given from 10 to 13·5 per cent. of increased yield over the local check. The Samsal strain of 1650 was tested in 8 replications and has given 10·78 per cent. increased yield. This strain appears promising, as it has given 20 per cent. increased yield, in four observation plots of 2 gunthas each, over the local Halga variety.

The artificial manurial trials on Halga variety of rice were continued on the Kumta Farm with and without farm yard manure. Ammophos and niciphos were given at the rate of 100 lbs. per acre while calcium cyanimide and bonemeal were given at 224 lbs. per acre. The dose of farm yard manure was 4,000 lbs. per acre. Ammophos and niciphos have increased the yield of rice by 37·1 and 35·2 per cent. respectively over the check plot of farm yard manure, while calcium cyanimide and bonemeal have given 25 per cent. of increased yield. All these manures have given significant results in the acidic soils of Kumta Farm and it is worth while to push on these manures.

5. *Rice Research at Karjat.*—The work mentioned on pages 166 and 167 of the last year's report was further conducted at Karjat with the object of increasing the yield of rice by manurial and cultural methods. The experiments conducted on this farm are summarized below :—

(1) With the object of reducing the dose of sulphate of ammonia, an experiment was conducted with different seedlings in each bunch namely 4, 8, and 12 with 30, 40 and 60 lbs. of Nitrogen per acre. This is the second year of the experiment conducted on scientific lines. The results are given in the following statement :—

	4 seedlings per bunch.	8 seedlings per bunch.	12 seedlings per bunch.
	Yield of grain per acre.	Yield of grain per acre.	Yield of grain per acre.
	Lbs.	Lbs.	Lbs.
30 lbs. of nitrogen per acre	3,109	3,071	3,007
40 do. do.	2,934	3,114	2,999
60 do. do.	3,199	3,140	2,909
No manure	2,083	2,541	2,362

From the results it will be remarked that—

(*a*) The yield of grain with any number of seedlings per bunch does not increase with the increased dose of sulphate of ammonia.

(*b*) That the tillering was less than that of last year.

(*c*) That the results of 4 seedlings are better than other sizes of the bunch.

(*d*) That the most promising results are obtained with 4 seedlings in each bunch and 30 lbs. of nitrogen per acre.

(2) The purity of seed of Kolamba strains of different generations given in the district was tested at the Karjat Research Station. 22 Samples were examined from 4 to 8 generations of the registered seed growers and they continued from nil to 19 per cent. of mixtures. The samples from Kalyan Taluka were almost pure while Kolaba samples contained highest mixture.

(3) The effect of sulphate of ammonia was tested on early variety of Kolamba No. 401 by A B B A marked in 5 replications with 30 lbs. of nitrogen per acre given in 2 doses. The results are very satisfactory as it has increased the yield by 47 per cent.

(4) The experiment to determine whether continued application of sulphate of ammonia reduces the lime contents of the soil, was continued for the third year and the results show that a standard dose of 60 lbs. of nitrogen per acre causes more lime to be washed away in drainage.

(5) The results of pot and field experiments about the time of applications of sulphate of ammonia and its different combinations tend to show—

(*a*) that rice plant can assimilate nitrogen even it is applied as late as at flowering stage,

(*b*) that the application of nitrogen at preflowering stage is more important than at tillering,

(*c*) that the flowering dose is important for getting heavier ear-heads,

(*d*) that with 40 lbs. of nitrogen per acre, the combination of preflowering and flowering dose is superior to any other combination,

(*e*) that fractination of 60 lbs. of nitrogen in 3 doses at tillering, preflowering and flowering has given the best yield viz. 41·8 gramms per pot,

(*f*) that the fractination is more economical than applying the manure all at once,

(*g*) that there seem to be many chances of causing an economy in the cost of manures by judicious and timely manuring.

(6) It is confirmed from the second year that the manuring with sulphate of ammonia reduces the proteid contents of rice and that large variations occur due to seasonal factors. Application of super-phosphate has increased the proteid contents than no manure plot. Groundnut cake has also effected in increasing the proteid while potasium sulphate has reduced the proteids. Organic manures help to maintain the level of proteid contents and this may lead to the necessity of a combination of organic and inorganic manures to obtain increased grain yield without corresponding decrease in proteid contents.

(7) The determination of dry matter of rice plant was once conducted by the Agricultural Chemist, Bombay Presidency, at every fortnight. But this period in the life of rice plant is too much. Hence it was thought that weekly determination might solve the problem of finding out the proper time of application of manures. Two strains viz. Kolamba 42, and Kolamba 401 were taken for study and an equal number of bunches were uprooted every week after transplanting and dry matter of different botanical points such as roots, stems, leaves etc., was determined and calculated for 100 bunches in each case. The study reveals that dry matter does not increase steadily but there are ups and downs during certain weeks showing that the assimilating capacity of the plant changes. Such active periods in the case of Kolamba 42 fall between (1) 32 and 39, (2) 53 and 60, (3) 67 and 74 days after transplanting. This suggests

that the plant would be in a better position to take adequate advantage of manure if applied during the above 3 periods. In the case of strain No. Kolamba 401 the rate of increase is almost steady right up to 30 days from transplanting, after which, the growth is very active for 3 weeks. From the observations it seems that in the case of early and midlate strains, two doses will be sufficient.

(2) *Nagli.*

6. According to the minutes of the Crop Research Committee, the 4 strains of Nagli viz. A 16, B 11, E 31 and E 82 were once more tried by the Fisher's method with local Kalperi check at Hatkamba Sub-Station and they have given 40, 20, 15 and 15 per cent. increased yield over the local check. No more trials are now necessary but the seed should be multiplied and distributed in the districts.

The manurial trials, mentioned on page 167 of the last year's report, were also conducted on B 11 and E 31 by the Fisher's method in 4 replications, but the doses were reduced by 50 per cent. to reduce the cost of manuring. In the case of B 11, the doses of sulphate of ammonia (40 lbs.) and bonemeal (56 lbs.) per acre have given 672 lbs. of nagli per acre while the fish manure (160 lbs.) has given 666 lbs. of grain. In the case of E 31 these two manures have produced 863 lbs. and 806 lbs. of grain per acre. From the results it can safely be said that the combination of sulphate of ammonia and bonemeal can safely be recommended for nagli when fish manure is costly and scarce.

(3) *Sugarcane.*

7. The manurial experiments on sugarcane (referred to on page 161 of the last year's report) were continued at Kumta Farm, with the addition of niciphos and calcium cyanimide. Variety selected was Red Mauritius, which has been sufficiently established in Kanara. From the results of original and duplicate plots, it is noted that niciphos has given the highest yield of 11,980 lbs. of liquid gul per acre, while the outturn of farm yard manure plot was 6,720 lbs. of liquid gul per acre. Next in order comes the plot treated with the combination of bonemeal, sulphate of ammonia and undi cake, its yield being 9,744 lbs. of liquid gul. Undi cake and sulphate of ammonia stands third in order. From these results the prospects of niciphos are very good in the Kanara District for sugarcane crop; but further trials are necessary to confirm the results.

The five promising varieties viz. J 213, H M 87, H M 544, mauritius 55, and Red Mauritius were tried on the Kumta Farm, in four replications. Side by side five varieties received from Coimbatore viz. CO 212, CO 290, CO 313 and CO 281 were also tried. The following yields are recorded.

H. M. 87 has given the highest yield of 52·3 tons of cane giving 16,580 lbs. of liquid gul per acre. Next to that CO 312 gave 52·3 tons of cane producing 14,400 lbs. of liquid gul per acre. H M 544 takes the third place and CO 290 stands fourth in order of merit. Further trials are essential to coroborate the results.

Cultivation of Cane on up-lands.—This was the first trial to see whether seedlings of cane can be raised in nursery during hot weather and they can be transplanted to the uplands in the beginning of monsoon. The cost of cultivation can be decreased and the crop can be raised with rain water. The seedlings of two varieties viz. J 230 and Red Mauritius were raised in the nursery from March to the end of May and they were then transplanted on high lands. The crop was ready by the end of December. The yield of J 213 was 6,840 lbs. of gul and that of Red Mauritius was 7,721 lbs. of gul per acre. These results are also encouraging and will help the extension of sugarcane cultivation.

At the Ratnagiri Farm the trials of H M 544, H M 87, H M 89, Red Mauritius and 6 varieties from Coimbatore were tried during the year under report. Out of which H M 87 has given the highest yield viz. 1,04,943 lbs. of cane weight per acre. The weight of Red Mauritius was 93,091 lbs. per acre. The Coimbatore varieties were tried on a very small scale and hence the yields cannot be compared with other varieties. However CO 281, CO 312 and CO 219 appear to be promising varieties. As the area under this cane was very small all the standing crop was sold for seed purposes or raw chewing.

(4) *Pine-apple.*

8. Two varieties of Que and Queen pine-apples are grown on 10 guntha plots of the Ratnagiri Farm and they are producing excellent fruit. The weight of each fruit varies from 8 to 11 lbs. and if the fruit is secured early in February or in March, it will command very good price in Bombay. There is a good scope for extending its cultivation in Konkan and the demand for suckers is very great. A special demonstration was held in May 1932 to show this crop to the public.

(5) *Vegetables.*

9. Among the rabi crops cabbage, knolkhol, brinjals and chillies were found very profitable and people have taken a liking for the same. The Ceylon variety of sweet-potatoes have now been firmly established and can be taken as a rabi crop in low-lying lands after the rice is harvested. Similarly, Spanish-peanut and small Japan are successfully taken as a dry crop in the rabi season and the yield varied from 800 to 1,000 lbs. per acre. These crops are far more remunerative than *kulith* or *wal* which are commonly grown in rice fields in the rabi season.

(6) *Mangoes.*

10. The Mango Research was discontinued by the end of September 1931 and full report of the 6 years investigations has been prepared by the Mango Investigator under the guidance of the Deputy Director of Agriculture. As this work is now transferred to the Horticulturist to Government, it is not necessary to add anything to the last year's report.

(7) *Crabs.*

11. The experiments on the destruction of field crabs were continued and both fumigant poisons and baits were tried. Out of all the treatments fumigation with carbon-bisulphide is found efficient when the water level goes down in the month of October. The percentage of success was 87·5 and the cost of treating 700 burrows (one acre) was only Rs. 1-10-0 for the fumigants. Potasium cynide was cent. per cent. effective but its cost, viz. Rs. 21 per acre was prohibitive. Among the baits in pots maximum catches (103 crabs) were obtained with country liquor. *Earth* worms stand second in order with 41 catches while rice bran and fermented jagaree stand third with 25 catches. As the post of the Entomological Assistant is retrenched, it is not possible to conduct the work any longer.

(8) *Store-pest.*

12. The experiments of the control of store-pest of paddy were conducted at Karjat. Out of the five treatments, carbon-bisulphide treatment in bins before preserving the paddy in *kanga* is the best, as only 4 per cent. damage was found in this treatment. Of all the strains Kolamba Nos. 42 and 226 are the least affected, while Kolamba Nos. 79, 401 and 412 are more susceptible to the insect attack.

At the Ratnagiri Farm the storage experiments were conducted with Kolamba No. 79 with the following treatments and their results are given below :—

	Per cent. of damage.
(1) Usual imperfect drying	14·36
(2) Mercury treatment	15·34
(3) Fumigation with carbon-bisulphide ..	10·91
(4) Perfect drying for 10 days ..	8·51

II—PROPAGANDA.

13. The principal items of propaganda mentioned in paragraphs 31 to 45 of the last year's report were continued during the year under report and their details are given below :—

14. (1) *Introduction of high yielding rice strain.*—The new system of introducing rice strains described on page 172 of the last year's report has now been appreciated by the public. During the year 1931-32 the total area under the registered seed growers was 550 acres and the number of seed growers were 75 in Thana and Kolaba Districts. The total quantity of seed of the Kolamba strain distributed to the seed growers was 16,820 lbs. From the area of 550 acres of registered seed growers nearly 1,000,000 lbs. (ten lac) of seed should be available for general distribution but due to the unexpected rain in October and November 1931 only 300,000 lbs. of seed was available which would

cover the area of 10,000 acres in 1932-33. The seed was distributed through the—

(1) Registered Seed-growers.
(2) Land-lords.
(3) Traders.
(4) Agricultural Requisite Societies.
(5) Grain Depots.
(6) Taluka Development Associations.
(7) Revenue Officers.

The Jambul Agricultural School was abolished from 1st April 1931 and the land of the School was returned to the heir of the late Rao Saheb Pisal. The Department thereby lost the means of propagating pure strains of rice. But the Trustees of the Pisal Land Trust offered their 44 acres of rice land for this work and the cultivation was arranged with the tenants on a fixed share system. The strain Nos. Kolamba 42, 79 and 184 were grown on this land and the standing crop was purified. At the end of the year the following pure seeds are available for distribution during 1932-33 :—

	Lbs.
Kolamba 42	10,520
Do. 79	2,571
Do. 184	4,795

This seed will be sufficient for 500 acres.

In the Ratnagiri District the following quantities of seed was supplied to the registered seed growers in 1931-32 :—

			Average increased yield over the local check.
Panwel	No. 61 ..	2,130 lbs. ..	15 to 20 per cent.
Patni	No. 6 ..	788 ,, ..	16 to 29 ,,
Waksal	No. 207 ..	140 lbs. for village trials.	10 to 18 ,,
Kudai	No. 25 ..	596 lbs. ..	12 to 23 ,,
Kolamba	No. 79 ..	626 ,, ..	15 to 18 ,,
Do.	No. 184 ..	390 ,, ..	12 to 15 ,,
Do.	No. 401 ..	102 ,, ..	18 to 20 ,,
Do.	No. 42 ..	306 ,, ..	10 to 14 ,,

The area under these strains was 85 acres. The total produce of this area would be 125,000 lbs. but half of this was available for general distribution and would cover the area of 1,000 acres.

In the Kanara District the area under Muskati variety is increased to 400 acres on the coastal belt of Kumta, Honawar and Karwar Talukas. The area under Halga (mass selected seed) is about 500 acres in Sirsi and Siddapur Talukas and the Sirsi Taluka Development Association has distributed 2,800 lbs. of pure seed of this variety.

15. (2) *Introduction of Nagli strains.*—Last year 850 lbs. of the four strains of nagli, viz. A 16, B 11, E 31 and A 82 were supplied to the

registered seed growers and were grown on 100 acres. These strains have given increased yields from 10 to 20 per cent. over the local check. The total produce from this area was 75,000 lbs. of nagli. Half of which was preserved for seed purposes for the year 1932-33. During the year 1932 (May), 1,650 lbs. of nagli strains have been made available for seed growers and they will cover 200 acres.

16. (3) *Manures.*—The work mentioned on page 173 of the last year's report was further carried out. The trials of niciphos were conducted in various places in Kanara and Ratnagiri Districts on rice crop at the rate of 100 lbs. for high land and 150 lbs. for low-lying land in 2 doses and the manure had got excellent effect. In the case of high land, the yield was increased from 17 to 33 per cent. while in the case of low lands, the increase varied from 15 to 29 per cent. Due to heavy rain the crop was lodged and consequently higher yields could not be obtained. The Imperial Chemical Industries Ltd. has now opened 25 Manure Depots in Konkan Division for the sale of manures but due to the depressed conditions, the sale was decreased. In Ratnagiri District the use of sulphate of ammonia and bonemeal for nagli is vigorously extended as the fish manure was not sufficient. Similarly the use of sulphate of ammonia for rab and field manure for rice and stimulent for water-melon cultivation in Thana and Kolaba Districts is now very common and there is better scope for the sale of this stuff.

During the year under report the following sale of artificial manures was effected through all the agencies :—

	Tons.
1 Sulphate of ammonia ..	70
2 Bonemeal	41
3 Superphosphate	6
4 Niciphos	12

17. (4) The supply of denaturalised salt was continued at the reduced rate of annas 8 per maund and the licenses for 1,515 maunds were issued.

18. (5) *Implement and Machinery.*—There was very little progress made in this direction as the Meston plough was found heavy for Konkan cattle. Trials of the new plough designed by the Agricultural Engineer were taken at Karjat but it could not satisfy the people as its mould-board was altogether removed. The Cooper Engineering Works of Satara has now designed a new Konkan plough and its trial will be taken in the coming season. There is a keen demand for pumping plants in Thana District but the Boring Department is abolished and the Fitter was discontinued. Correct figures for the new plants could not be ascertained.

There is a good demand for Bulsar Rahat in Kanara District and the local black-smiths have supplied 25 rahats to the coastal villages. In the Ratnagiri District, Mr. Sathe of Sangameshwar has supplied 60 rahats during the year. The introduction of power crushers in Kanara

has made good progress and there are now 5 power crushers working in this District. These are very useful for hard canes.

The improved furnace of the Poona type for boiling paddy was found very advantageous as it saves fuel and time. A flat bottom pan of 15 inches in height is more suitable for this purpose.

19. (6) *Breeding Bulls.*—The following premium bulls were maintained in Konkan Division during the year under report :—

(1)	Gir bull at	Mulund	covered 25 cows.
(2)	Do.	Dombivali	covered 52 cows.
(3)	Do.	Umbergaon	covered 7 cows.
(4)	Do.	Maroli	covered 15 cows.
(5)	Do.	Saphala	covered 13 cows.
(6)	Do.	Chinchani	covered 16 cows.
(7)	Buffalo bull at	Palghar	covered 15 she-buffaloes.

The buffaloes at Ratnagiri and Kumta Farms covered 108 and 80 she-buffaloes respectively.

There is a demand for more Gir and Dangi bulls but for want of funds this work could not be extended.

20. (7) *Spraying against Koleroga.*—During the year, the attack of Koleroga on *supari* was not very severe for want of break in rain. There was much trade depression and hence only 576 acres of *supari* was sprayed with Bordeaux mixture. The area sprayed in each taluka is given below :—

	Acres.
(1) Siddapur	135
(2) Sirsi	160
(3) Yellapur	60
(4) Honawar	209
(5) Kumta	12

The work of spraying was extended in 100 villages. The training classes of climbers were arranged in 20 places. The progress was very satisfactory in Honawar Taluka. But at Siddapur the sprayed area was reduced due to depression and political atmosphere. The spraying materials worth about Rs. 2,600 were supplied through the Taluka Development Association, Sirsi, and the Agricultural Requisite Society of Siddapur and local merchants.

During this year one portable hand sprayer was purchased for Rs. 150. This sprayer is worked on the ground and the climber can spray the bunches with a hose pipe connected with the sprayer. This is a handy machine and can be taken in the interior of the gardens.

21. (8) *Dusting of mangoes.*—The work of dusting mangoes with sulphur has taken a firm root in Ratnagiri District. In Vengurla, Malvan, Devgad and Ratnagiri talukas more than 7 tons of sulphur was utilised for dusting and 12 Peerless Dusters were purchased during this year in addition to 50 dust guns already working in this division. With the extension of flexible rubber tube they can dust a mango tree to a height of 30 feet.

This year the attack of mildew and hoppers was not very severe and so one dusting was quite sufficient to check the attack.

Dusting work was demonstrated in Thana and Kolaba districts, where nearly 500 trees were dusted. The effect of dusting was seen in increasing the yield by 50 per cent. over the non-dusted trees. Dusting method is now followed in Janjira State and Surat District where the people are convinced of its advantages.

A trial of the power dusting machine was made during the year under report and about 100 trees were dusted in 7 hours and the quantity of sulphur required was 340 lbs. The cost of labour per day comes to Rs. 3-4-0 while the cost of the material such as petrol, mobil oil, etc., comes to Rs. 7-11-3 per day. If the cost of 340 lbs. of sulphur, viz. Rs. 30 be added to the above charges the total cost of dusting 100 trees will come to Rs. 40-14-3 or roughly annas 6 and pies 6 per tree. If the work is done by the Peerless Dust Gun, the cost is nearly the same. But as the period of dusting is very short, the power machine has got decided advantage in treating large number of trees. The power duster requires more sulphur per tree as the dusting is done all over the trees and not only to the inflorescence. But it is believed that this extra cost can be reduced by the admixture of sulphur with an inert substance in the proportion of 4 : 1 so that each pound of adulterated sulphur will cost less than 100 per cent. sulphur. There were some difficulties in taking this machine in uneven and undulated slopes, but this machine will be more useful on Vengurla and Malvan sides where mango gardens are raised on level ground.

(9) *Grading of Mangoes.*

22. Encouraged by the results of propaganda carried out in 1931 for grading the mango fruit before sending the same to Bombay for sale, two Co-operative Mango Sale Societies were registered in March 1932—one at Malvan and the other at Vengurla in the Ratnagiri District. The existing Sale Society at Ratnagiri was revived and arrangements to start co-operative sale of mangoes through these societies were made.

Two temporary posts of graders were created for carrying on the grading of the fruit at Malvan and Vengurla and the non-graduate Fieldman at Ratnagiri was entrusted with that work at Ratnagiri.

Mr. R. K. Apte, the Agricultural Organiser, Co-operative Societies, Palghar, had been carrying on propaganda under the direction of the Deputy Director of Agriculture, Konkan Division, Ratnagiri, from November 1931. It was thus possible to start the work even though the societies were registered as late as in March 1932.

As however the persons carrying on this trade are generally men with little capital of their own and usually obtain advances from the Bombay dalals on condition of selling the mangoes through them, it was not possible to secure their co-operation on a large scale this year. The owners of gardens at Malvan, Vengurla and Ratnagiri sold their mangoes through the societies.

The Horticulturist to the Government of Bombay, Poona, wanted graded select fruit for sending experimental consignments to Europe. All his requirements were solely supplied by the members of these three Sale Societies. These, it may be mentioned here, included the excellent mangoes sent to His Majesty the King Emperor and very highly appreciated by His Majesty.

The prices secured for the graded fruit brought home clearly to the members the advantages of the method and led to its almost general adoption.

The general trade depression and especially the unsatisfactory condition of the Bombay market were very unfavourable to the mango trade this year as would be evident from the prices obtained on the same date during last year and the current year for fruit of the same grade as tabulated in the following statement :—

Statement giving comparative prices of mangoes in Bombay in 1931 and 1932 per dozen.

Date.	Special.		First.		Second.	
	1931.	1932.	1931.	1932.	1931.	1932.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
30th April ..	2 0 0	1 8 0	1 8 0	1 0 0	1 4 0	0 8 0
1st May ..	2 0 0	2 0 0	1 8 0	1 8 0	0 12 0	1 0 0
2nd May ..	2 0 0	1 12 0	1 8 0	1 8 0	0 12 0	1 0 0
3rd May ..	2 0 0	1 8 0	1 8 0	1 2 0	1 4 0	0 12 0
4th May ..	2 0 0	1 8 0	1 8 0	1 2 0	1 0 0	0 8 0
5th May ..	1 12 0	..	1 0 0	0 12 0	1 2 0	0 9 0
6th May ..	2 0 0	1 8 0	1 8 0	1 0 0	1 0 0	0 12 0
7th May ..	1 12 0	1 4 0	1 8 0	1 0 0	1 0 0	0 14 0
8th May ..	2 5 0	1 8 0	1 8 0	0 12 0	1 4 0	0 9 0
9th May ..	2 0 0	1 0 0	1 12 0	1 0 0	1 4 0	0 12 0

The Mango Sale Societies appointed dalals in Bombay and arranged to sell the graded fruit through them for the members. The societies received the parcels at the port, booked them to Bombay and paid the price realised to the members after deducting the marketing charges. The Societies did not charge anything extra for the services rendered to the members. Arrangements to dispose of the empty boxes in Bombay also were done by the societies. The Agricultural Department had supplied free of charge labels showing the different grades—special, first and second—for being affixed to the parcels. The graders above referred to, helped the members in grading the fruit. The customers in Bombay were saved much bother and could obtain fruit according to their requirements by specifying the particular grade to the details of the Societies in Bombay.

The Ratnagiri District Agricultural Association had advertised in the Bombay Papers the advantages of direct purchase of graded mangoes from the growers and saving the middleman's commission. Quite a

number of orders were received in response to these advertisements and executed by the members of the societies. Mr. Gilligan, I.C.S., the Collector of Ratnagiri, has been taking keen interest in the development of this important trade and helped the Ratnagiri Society by supplying orders of European Clubs, hotels, messes, etc.

Owing to late rains the season commenced rather late about the 20th of April and just when it was coming into full swing the riots broke out in Bombay (about the 15th of May 1932) and led to complete stoppage of the trade, for a few days. The stormy weather in the end of May prevented any possibility of recovery and the members had to content themselves by sending parcels to places like Belgaum, Poona, Kolhapur by motor and rail or dispose of the fruit locally for abnormally low prices.

These factors were however beyond human control and the Societies, if anything by their influence and help from the Government Departments, helped to minimise the loss from these causes.

As an example of the influence exerted by the societies, may be mentioned the prompt instructions issued by the B. S. N. Co. to their agents at Vengurla to pay better attention to the loading of mango parcels into the steamer at Vengurla, at the request of the Chairman, Vengurla Co-operative Mango Sale Society.

The Societies do not simply aim at affording better marketing facilities to their members but have undertaken the joint purchase of manures like bonemeal and insecticides like sulphur and boxes for packing the fruit. It was also intended to undertake canning for surplus fruit on behalf of the members and a small beginning has been made in this direction. In all over ten thousand parcels of graded mangoes were despatched to Bombay and other places by the members.

23. (10) *Shows and Demonstrations.*—During this year 6 big Shows and 110 demonstrations were arranged in the Konkan Division. Most of the big shows were opened by the Collector of the district. At Chiplun the Agricultural Association had arranged a show of garden crops which was attended by 700 cultivators. At this show, excellent samples of vegetables such as cabbage, knolkhol cauliflower, brinjals, water-melons, supari and oranges were exhibited. Similar shows were organised at Dugad and Navalpada in Thana District and at Panwel in Kolaba District which were attended by several thousand cultivators. A District Show was organised at Betegaum in the Thana District under the auspicious of the Bombay Goraksha Mandal which was opened by Sir Purshottamdas Thakurdas. At Alibag a special stall of agricultural produce was arranged in the Health and Child Welfare Exhibition opened by Sir Govindrao Pradhan. This was the most attractive feature of the Show. Besides the above shows and demonstrations, 160 magic lantern lectures were given by the staff on various subjects of agriculture in this division.

In Kanara District special meetings of cultivators were arranged at the time of the visit of the Director of Agriculture for free discussion on the agricultural problems of the district.

24. (11) *Introduction of new crops.*—(*a*) The improved Ceylon white and the American red varieties of sweet potatoes are now introduced in all the talukas of Ratnagiri District. These are taken twice or thrice in one year and provide sufficient employment for spare time of cultivators.

(*b*) The cultivation of onion is also spread in many parts of Konkan and special nurseries are now opened by Taluka Development Associations to supply the seedlings. This crop is successfully taken as a rabi crop in 40 centres of Ratnagiri District.

(*c*) Tobacco was tried in several places as a semi-rabi crop and the crop was found successful and the yields vary from 600 lbs. to 800 lbs. of cured tobacco per acre. In this case also special attention is required to raise the seedlings, as they are to be grown where the rainfall is very heavy. But with proper precaution this problem will be solved by the Taluka Development Associations.

(*d*) The Malbar variety of pepper vines was introduced in Kanara and it yields 30 per cent. more outturn than the local variety. Its extension is gradually made as the cuttings are available. Pepper growing in forest trees is also under trial at Killar in the Siddapur Taluka.

(*e*) The cultivation of tapioca is also making good progress in Honawar, Kumta and Karwar talukas of the Kanara District. In the Ratnagiri District it is grown along the fencing of garden crops.

25. (12) *Demonstrations of siloes.*—Preservation of green grass in siloes was demonstrated at Khed, Killar, Palghar and Dombivali and people have appreciated the value of silage for milch cattle. But a vigorous propaganda is required to induce the people to follow this method. The condition of cattle will not be improved unless they get succulent grass in hot weather.

26. (13) *Sugar-making in Kanara.*—At Killar the manufacture of sugar by Hadi process was continued during this year and 500 maunds of sugar was produced. The recovery was much better this year and there was a fair margin of profit as the price of gul has gone abnormally low. The molasses were mixed in liquid gul and fetched moderate price of one rupee per maund of 80 lbs.

27. (14) *Demonstration of preparing bonemeal.*—The simple method of preparing bonemeal by burning the bones for making them brittle and afterwards crushing them into country chuman ghani was demonstrated at Kumta, Karwar, Gimavi, Jalgaon and Wavashi and it was found that if bones are available, bonemeal can be prepared at a cost of Rs. 35 per ton. This manure is very useful for rice, nagli, and fruit trees as it contains both nitrogen and phospheric acid.

28. (15) *Poultry breeding.*—20 cocks of white leg horn were distributed in the Palghar Taluka for the improvement of local breeds with the help of the Taluka Development Association. At Rajapur, poultry farm has been started in the Agricultural School where leg-horn and Rhode Island Red can be had at a cheaper rate. The District Agricultural Association has given a special grant to organise a poultry farm at Shirgaon Farm.

29. (16) *Manuring of cocoanut.*—In Konkan District cocoanut trees receive only green leaves and a small quantity of farm yard manure as manure. During the year under report, the application of niciphos and undi oil cakes was demonstrated in 12 villages and it increased the yield by 40 per cent. over the local treatment. In Ratnagiri District a combination of 4 lbs. of bonemeal, 4 lbs. of oil cake, one lb. of sulphate of potash and 1 lb. of denaturalised salt was found very advantageous and the result will be watched with keen interest.

30. (17) *Publications.*—During the year 66 articles on agricultural subjects were contributed to the Shetaki and Shetakari, agricultural college magazine and the Kanarese monthly. The bulletin on sugarcane cultivation in Kanara is submitted for publication.

The following leaflets were published :—

(1) Improved strains of Kolamba rice for the North Konkan.
(2) Improved nagli varieties.
(3) Rice strain for Ratnagiri District.
(4) Grading of mangoes.
(5) Green manuring of rice.
(6) List of implements recommended by Agricultural Department for Konkan.

Besides short reports on crop and weather conditions, demonstration plots, meetings, etc., were regularly supplied to the *Times of India* through the local reporter.

III—Agricultural Organisation.

31. (1) *Divisional Board of Agriculture.*—During the year under report there were 4 quarterly meetings held at Belgaum, Ratnagiri, Kumta and Alibag which were attended by almost all the members of the board. As the Konkan Divisional Board will be reconstituted, I have to thank the non-official members for doing the honorary service for the last two years.

32. (2) *Taluka Development Association.*—There was no change in the existing number of Taluka Development Associations. Only one more association was registered at Mahad but it could not claim any subsidy from Government. The Chiplun Taluka Development Association and Devgad Taluka Development Association have applied for registration during this year. The Kalyan Taluka Development Association is now revived and deserves to be given a subsidy but the Ratnagiri Association has practically seized to do any work. Among the remaining ten associations, the work of the following associations deserve special mention.

(1) The Palghar Taluka Development Association arranged five big demonstrations and distributed 100 maunds of salt and 8 cocks of White Leg Horn. It has maintained a buffalo bull with the help of Village Panchayat and has distributed 9,000 lbs. of Kolamba seed. It has maintained a trained Kamgar and had arranged several demonstration plots.

(2) The Dahanu Taluka Development Association has given 10 cock of Leg Horn, 150 maunds of salt and 8,000 lbs. of rice seed and 4 tons

of sulphate of ammonia. It has organised 2 big shows and 12 small demonstrations. A Co-operative Chikoo Sale Society is being organised by the Association.

(3) The Taluka Development Association, Rajapur, has arranged 20 demonstration plots and has distributed 3,000 lbs. of rice seed and 150 lbs. of nagli seed. It has maintained a demonstration plot in co-operation with the Agricultural School and it serves a good object lesson for vegetable and fruit growing. It has arranged dusting demonstrations on mangoes and has arranged several lectures in the Taluka. It has also helped the cultivators during the high flood of the last year.

(4) Dapoli and Malvan Taluka Development Associations have put in fair work on the lines mentioned above.

(5) The Sirsi Taluka Development Association has tried to push on the work of spraying against koleroga to the extent of 160 acres. It has supplied 25,000 sets of H. M. varieties of cane and has arranged trials of the portable hand sprayer in 4 centres.

(6) The Karwar Taluka Development Association has maintained a nursery for the supply of mango grafts. It has distributed 3 tons of sulphate of ammonia and 400 lbs. of Maskati rice seed. It has arranged one horticultural class and has demonstrated the manufacture of bone-meal.

(7) The Mahad and Roha Associations have extended the cultivation of Kolamba No. 42 and have distributed 7 tons of sulphate of ammonia. The Mahad Association has arranged a big sugarcane farm in the field of Mr. Isane where H.M. 89, H.M. 544, D. 109 and J 213 varieties are grown on a large scale. Poona furnace was constructed and the method of preparing gul was demonstrated with the help of a trained gulva from the Manjri Farm. It has also arranged 6 tobacco plots in the Taluka. Both the Collector of Kolaba and the Commissioner, Southern Division, have appreciated its work.

33. (3) *Co-ordination with Revenue and other officers.*—There were 2 co-ordination meetings in the Kanara District which were attended by large audience. In the Ratnagiri District 4 meetings were held in Chiplun, Dapoli, Rajapur and Malvan talukas when special agricultural programme was arranged. In Kolaba there were three meetings at Mahad, Roha and Mangaon when the Collector of Kolaba was present. In Thana 5 special meetings were held in Palghar Taluka, 2 big meetings at Navalpada and Dugad which were attended by more than 500 cultivators. Almost all the District and Taluka Local Boards have given small grant to all the Taluka Development Associations in their jurisdiction but special mention should be made of the Ratnagiri and Thana District Local Boards which have contributed large amounts for the gricultural improvements.

34. (4) *Non-credit Socities.*—During the year under report the Agricultural Requisite Society of Palghar and Chilly Sale Society of Chinchani in the Thana District have done very good work. The former has distributed almost 9,000 lbs. of Kolamba seed and 3 tons of sulphate of

ammonia, while the latter has effected a sale of 15,000 rupees worth chillies. A Grain Bank was started at Jambul with the help of Local Board. An Agricultural Requisite Society has been organised at Panwel. In the Ratnagiri District 2 Co-operative Mango Sale Societies have been organised at Malvan and Vengurla and the Ratnagiri Mango Sale Society was reorganised. Canning of mango juice was arranged with the help of these Societies and about 1,000 cans were filled and preserved. This method was shown to 500 cultivators. The Agricultural Requisite Society of Siddapur is making good progress in the sale of iron pans, rice seeds, cane crushers and manures.

35. (5) *Agricultural Classes.*—During the year special classes were arranged at (1) Karwar for horticultural work which was attended by 40 students and (2) at Honawar for general fruit cultivation. It was attended by 34 students. A horticultural class was arranged at Rajapur and a vegetable growing class was organised at Chiplun. At Navalpada in Thana District a general class in agricultural improvements was held for 3 days and it was attended by 50 agriculturists. Lectures and practical training in rab making, manures of rice and field embankment were given. All these classes served a very useful purpose.

36. (6) A Shikar Party was organised for the first time in two centres of the Kalyan Taluka of the Thana District in October 1931. The Taluka Local Board and the Kalyan Taluka Development Association contributed Rs. 75 and local contribution of an equal amount. Rs. 125 were actually paid to the shikar party and the remaining amount was retained. Two centres were selected, viz. Kolum and Mulgun where one pregnant sow, 2 spotted deer and 4 Neel cows were killed. The effect of this work will be seen in the coming season.

IV—Agricultural Education.

37. Jambul Agricultural School was closed from 1st April 1931 and hence the Konkan Division lost the opportunity of getting the agricultural education for the sons of agriculturists.

An attempt to supply this want of agricultural education has been made by the Rajapur Shikshan Prasarak Mandal by opening an agricultural school at a great cost. The services of a trained Agricultural Graduate have been taken by this institution and the school was managed fairly well. There were 12 boys in this school who are selected from the 6th and 7th vernacular standards with the object of completing the course within one year. The School was inspected by the Inspector of Agricultural Schools and the Deputy Director of Agriculture who have appreciated the work done at the cost of Rs. 5,000 to the private institution. The boys appear to be quite well up in theory and practical agriculture and most of them have made a business of raising seedlings of vegetables and selling them at a reasonable profit. On the whole if this school is continued the public are likely to take advantage of the same..

Personal.

38. During the year under report all the staff had to work under greatest inconvenience on account of retrenchment and want of funds. However most of them have put in substantial work. The work of Mr. V. R. Subnis, District Agricultural Overseer, Ratnagiri, deserves special mention for organising demonstrations and nurseries for supply of plants.

V. V. GADGIL,

Deputy Director of Agriculture,
Konkan and South Central Division.

Poona, 10th August 1932.

APPENDIX H.

Summary of Work done under the Professor of Agriculture, Poona, for the year 1931-32.

Charge.—Mr. V. G. Gokhale continued to be in charge of the office of the Professor of Agriculture throughout the year.

2. *Lines of work.*—The lines of work, as before, may be put into four sections, viz. :—

(A) *Teaching.*—This is the primary work of this section. It comprises the subject of Agriculture including Animal Husbandry and Dairying, taught as laid down by the Bombay University for the degree of Bachelor of Agriculture, and amounts to about 46 per cent. of the total teaching work of this College. Two of the Department's largest institutions namely the College Farm and the College Dairy are also required to be run mainly for the purposes of practical instruction in this subject.

This section has also to conduct the instruction in the above mentioned subjects to the Short-Course class—a special one year's course for practical men—occupying about 70 per cent. of their total teaching at this college.

In addition to these two regular courses, special courses are also offered particularly in practical affairs of farm and animal management.

(B) *Research and Investigations.*—Whatever odd and suitable time is available after meeting the primary needs under teaching, is utilised by every member of the staff to work out such items of research as are possible.

(C) *The Commercial working of the Dairy.*—Besides serving as a unit for practical instruction of students, the College Dairy is run on a commercial basis.

(D) *Aid and Assistance to the Public.*—This part of the work consists in helping the public with information on a variety of agricultural matters such as cultivation of crops, manures and manuring, implements, seeds, etc.

3. *Staff.*—From the 1st of March 1932, a reduction of 3 graduate demonstrators and 3 non-graduate assistants was ordered owing to the financial stringency of Government. With this change the strength of the superior staff was as follows :—

Posts.	Position on 1st April 1931.	Position on 30th June 1932.
Professor of Agriculture, in the Indian Agricultural Service	1	1
Assistant Professor in the Bombay Agricultural Service	2	2
Lecturers	3	3
Demonstrators	5	2
Graduate Assistant for Fertiliser Research .	1	1
Total ..	12	9

To meet the situation created by the retrenchment, the number of batches for practical work and the optional subject have had to be reduced, the short-course has had to be abolished, thus resulting into some inevitable sacrifice of efficiency.

A.—Teaching.

4. *The Graduate Course.*—In all 82 students appeared in agriculture for the degree examination out of which only 70 per cent. as against 80 per cent. of the last year have passed.

There were in all 14 students that took Intensive Study of Crops for their optional subject, 6 taking dry crops including a detailed study of cotton, 7 taking irrigation crops including sugarcane and its alternative and market gardening and one taking rice and the alternative and additional crops grown in the rice regions. The percentage of passing was 71 as against 77 during the last year.

In the Intermediate Agricultural Examination, out of 75 that appeared in Agriculture, 92 per cent. as against 87 per cent. passed. The need of increasing the standard of passing in Agriculture from 33 to 40 per cent. in order to improve the general standard at the College has been brought to the notice of the University by the examiners.

There has been no marked change in the general calibre, the only possibility of improving which is to keep an inducement of an attractive post to the first class first graduates which is being emphasised in my annual reports for the last four years.

The question of preparing suitable text books in the subject of agriculture remained in abeyance owing to the insufficiency of assistance and it appears that this important matter has now to be postponed *sine die* owing to the heavy retrenchment in staff as mentioned under paragraph 3 above.

5. *The M.Ag. Course.*—Two students were registered during the year—one for a thesis on *Factors in successful growth of Potatoes* and the other for a study of *Problems in Dairying in the Deccan.* The former left his studies in January 1932.

6. *The one year's General Short Course.*—There were in all 11 students to begin with. Out of this number only 7 completed their course and all passed in the subject of Agriculture. The general calibre was only fair.

Special Courses.—Those given during the year were as shown below :—

	Number of students.	Duration of the course.
(1) Special training in Animal Husbandry .	1	35 days.
(2) Special training in the Indore method of compost making	5	70 days.

7. *The College Farm.*—This farm is maintained mainly to afford all possible facilities for the teaching of practical agriculture. Consistently with this main purpose, it also provides land and facilities for carrying

out researches involving field experiments to the several sections of the College. A representative collection of indigenous as well as improved implements is specially maintained for the benefit of the students as also of the visitors. A small workshop is run mainly to help in the teaching of carpentry and smithy to the first year students by the Engineering section and secondly to effect necessary repairs to the farm-owned implements as also of the public whenever possible.

An interesting museum of all possible growing crops of the Bombay Presidency is specially maintained in both the *kharif* and *rabi* seasons and this has been of great help to the students both of this and the other institutions.

The area of the farm remained the same as in the last year, viz., about 275 acres, of which about 125 acres were under cultivation, about 50 acres under grazing and the remaining either under building, recreation grounds of students, roads, wells, waste land and *nalas*.

The total rainfall from 1st of May 1931 to 30th April 1932, was 23·89″ as against 29·6″ of the previous year and an average of about 27″. Rain started about the middle of June but really useful rains were received by about the first week of July. Sowings of *kharif* crops could thus be done in the middle of July. The latter half of July and almost the whole of August was cloudy with generally small showers as against a comparatively drier period in the previous year. The first half of September was dry while the latter part of this month was very rainy with over 7″ rain and this wet weather continued till the middle of October with 2·56″, when again an open period was evident till the beginning of November. In the first week of November, again heavy rain measuring 2·80″ on the first and second was received. The period from the second week of November to the end of the year was rainless. Though the total rainfall was thus less than that of the previous year, it was better distributed. The heavy rains in August severely damaged the flowering and fruiting crop of French beans and generally obviated weeding and intercultivation of most crops. The heavy rains of October caused a large discoloration of *bajri* grain, a heavy set-back to brinjals, yams, *guvar* and betel leaf, rotting of tomato fruits and a general premature leaf drop of early groundnuts.

The winter this year was 3-4 degrees cooler compared to the last year but it hardly went below 45°F except for a couple of days in December.

Aphis on cabbage, *mogri* (rat-tail radish) and safflower, mosaic on double beans, leaf shred disease on *jowar* (elichpuri), army worm caterpillars on *jowars* in general were the pests and diseases which did more or less damage. Known methods to combat these pests gave little success. Rust on wheat—severe on *shet parner* variety and more severe on the irrigated crop and practically nil on the dry crop of Pusa 4—was noted in the middle of January.

The effect of this year's season may be seen from the following table :—

Crop.	Average yield per acre in lbs.		Best yield in the history of the farm.	
	1931–32.	1930–31.	Per acre.	Year.
Kharif crops—				
Bajri	1,764	1,008	1,764	1931–32
Late groundnut (Big Japan) ..	1,650	1,756	2,768	1913–14
Early groundnut (Spanish Peanut) ..	1,505	1,772	2,082	1912–13
Cotton (N.R.)	696	470	1,900	1919–20
Rabi crops (dry)—				
Shalu jowar	1,692	1,208	2,578	1928–29

Outstanding features of this year's performance of crops.—The most satisfactory crops were onions for bulbs (25,800 lbs. as against 20,224 lbs. last year), *suran* (18·6 tons as against 12·5 tons last year), double beans (8,866 lbs. as against 5,021 lbs. last year), ginger (5,384 lbs. as against 4,404 lbs. last year), *gowar* (5,068 lbs. as against 1,025 lbs. last year), and tomatoes (7,438 lbs. as against 3,510 lbs. last year). The betel leaf crop yielded only about 28 *kudtans* as against 63 of last year on account of both old age as also October-November heavy rains. This plantation has now (9th year) come to an end of its profitable career. Sweet potatoes yielded 8,900 lbs. as against 13,562 lbs. last year and yams 7,184 lbs. as against 11,436 last year.

These results would indicate that the seasonal conditions vary year after year so much as to cause even cent. per cent. variations in yields and that there are yet many pests and diseases which take a heavy toll and for which no economical remedies are yet known.

The noteworthy results of some simple experiments given to students for practice will be noted under the section of Investigations and Research.

8. *The College Dairy.*—The continued financial stringency has caused the most urgent need of some important breeds of cattle and further modernizing this institution from a teaching point of view, to remain yet unsatisfied.

B.—Research and Investigation.

9. As mentioned above, small items of research were undertaken by the staff of this section according to any small amount of time that could be made available, a full-time Assistant being available only in connection with research into the value of nitrogenous artificial fertilisers, financed from the Sir Sassoon David Trust Fund. The results are summarised below.

10. *Accurate preliminary testing of the value of certain nitrogenous artificial fertilisers.*—This is the fourth year of this investigation. The quantities of fertilisers tested have been based to supply 10 lbs. and 20 lbs. nitrogen per acre in the case of *bajri* and *shalu jowar*, 20 lbs. in the case of groundnut and chillies and 20 lbs. and 40 lbs. in the case of onions. All the fertilisers of the last year were tried. The results show significant mean increases over no fertiliser in the case of :—

(1) *Bajri*—(*a*) 10 lbs. N. dose, 17·39 per cent. with calcium cyanamide, (*b*) 20 lbs. N. dose, with nicifos, nitrate of soda and calcium cyanamide, 46·41, 46·25 and 36·56 per cent. respectively.

(2) *Groundnut* with nicifos, complete fertiliser and sulphate of ammonia, 19·0, 18·2, and 12·5 per cent. respectively.

(3) *Chillies* with all the fertilisers varying from 32·8 to 44·9 per cent.

(4) *Onions.*—(*a*) 20 lbs. N. dose, with all the fertilisers, from 38·2 to 62·1 per cent. and (*b*) 40 lbs. N. dose, with all the fertilisers from 61·3 to 104·1 per cent.

(5) *Shalu jowar* has not favourably responded to any of the treatments.

The increases are also economical in the case of 20 lbs. N. in nitrate of soda with *bajri*, nicifos and sulphate of ammonia with groundnut and all the fertilisers with chillies (unirrigated) and onion crops.

Last year all the fertilisers with chillies, nitrate of soda with *bajri* and nitrate of soda and nicifos with groundnut showed significant increases, while with the remaining crops none of the fertilisers gave statistically significant advantage.

11. *Effect of artificial manure with and without organic matter.*—This is the third year repetition of the experiment in which the quantities of sulphate of ammonia and farm-yard manure are 50 lbs. and 2½ cart-loads per acre respectively. This year's crop was N.R. Cotton as against dry wheat of last year. The mean results of different treatments amount to an increase over no manure of 12·0 per cent. with sulphate of ammonia, 19·5 per cent. with farm-yard manure alone and 20·4 per cent. with farm-yard manure plus sulphate of ammonia. The increase obtained by the combination of sulphate of ammonia with farm-yard manure is however much below the sum of increases obtainable by each of the two treatments singly.

12. *Influence of weight of seed on the yield of cotton.*—This is a repetition in every respect of the experiment noted on page 189, paragraph 13, of the Annual Report of 1930–31, the method of obtaining the different grades being the same as described in the Annual Report for the year 1929–30, page 211, paragraph 10, and on page 189, paragraph 13, of the Annual Report for 1930–31.

The following are the salient features of the results :—

(*a*) *Germination*—

Grade of seed.	Heavy.	Ordinary.	Medium.	Light.
Percentage	81·5	77·8	75·4	63·5

(*b*) *Growth.*—As measured in November 1931 in terms of the height of plants, the different grades showed—

Grade of seed.	Heavy.	Ordinary.	Medium.	Light.
Mean height in inches .	48·86	49·66	49·34	46·14

(*c*) *Yield of seed cotton.*—The yields, calculated on a *per plant* basis, do not show any significant differences for any one grade over another. But calculated on the *per acre* basis, the heavy seeds gave significant increases over medium and light seeds while medium and ordinary seeds were each significantly superior to light seeds. This is apparently due to the difference in germination and consequently a lesser number of plants in the light seed plots.

These results being generally in agreement over the last three years of the experiment, may now be regarded as conclusive.

13. *Vegetable work.*—At the Crop Research Committee meeting in 1929 it was decided that more intensive and systematic work should be done on vegetables. This section was allotted the work of conducting investigations into the agronomical part of the subject. Previous to this year, however, this section had already in hand certain items of work which have now been fitted into the new scheme. The main directions of the work are indicated by the various headings summarised below :—

(A) *Planning the cropping scheme.*—The line of work not being finally settled there was no work to report upon.

(B) *Perfecting the technique of cultivation to get the maximum yields of the best quality of produce.*—The various methods of achieving this are noted below along with the summary of results :—

(*a*) *Manuring.*—This is the second year of the experiment with *suran and ginger crops*, the general plan being the same as was adopted during the last year (i.e., to compare the effect of artificial manures with 800 lbs. groundnut cake both given in addition to 20 cart-loads of farm-yard manure per acre. The artificial manures consisted of sulphate of ammonia, sulphate of potash and superphosphate to supply the respective elements and plant food in the same proportions as are contained in the respective average crops per acre. Nitrogen in the form of sulphate of ammonia was also tested separately), except that an additional plot having no top dressing was provided to ascertain exactly the share of concentrated manures.

(1) *Suran.*—The results with this crop in 8 replications, yielding on an average 18 tons per acre, show that the addition of concentrates is significantly better than no concentrates, but that there is no significant difference between the different concentrates.

(2) *Ginger.*—The average yield per acre was 8,000 lbs. With six replications, the different treatments do not show any significant differences either over farm-yard manure alone or among themselves.

(*b*) *Irrigation.*—Broad ridge method was compared with flat bed method for root crops of ginger and *suran* under Poona conditions with the following results :—

(1) *Ginger.*—This is the third year of the experiment. The bed method gave 2,352 lbs. per acre as against 6,436 lbs. on the broad ridges confirming the previous year's results.

(2) *Suran.*—In this third year of the experiment the bed method yielded 36,004 lbs. per acre as against 43,840 lbs. on the broad ridges thus confirming the previous year's results. The experiment has therefore been concluded.

(*c*) *Seeds and seedlings :—*

(1) *Relation of vigour of chillies seedlings to their final yield.*—This year's results indicate that though the seedlings obtained in raised seed-beds with complete manure (composed of 1·25 lbs. of sulphate of ammonia, 5 lbs. sulphate of potash and 6 lbs. superphosphate per 100 sqr. feet of bed area, were the best, the taller and stouter seedlings so produced did not result into an increased yield. This result being in corroboration with the previous year's results, the experiment has been concluded.

(2) *Mother sets* vs. *finger sets of turmeric.*—During the year under report the yield from mother sets is significantly better than that from the finger sets which results are not in agreement with those of the last year, in which there was no significant difference between the two kinds of sets.

(3) *Cut seed* vs. *entire seed in suran.*—This was the first year of the experiment. It was laid out by the Fisher's method in five replications. The yield per acre varied from 11 to 14 tons, the difference between the two kinds of seed not being significant.

(C) *Business management so as to get the best return from a garden holding including catering for the market needs.*—(1) Guvar (Cluster bean), (2) tomatoes and (3) brinjals were continued to be sown every month during the year. The general conclusions that can be drawn from the results of all the years with these crops are that they do not do well when grown at other times than those in which they are found ordinarily grown successfully. Climatic conditions from year to year being a variable factor control the relative performance of the crop in different years.

(D) *Varieties.*—This is the second year of the comparison of sweet potato varieties in which in addition to the Poona local red and Ratnagiri varieties, Australian was also included. The experiment was laid out by Fisher's method in 5 replications. The Poona local red gave 7,520 lbs., Ratnagiri 14,080 lbs., while the Australian gave 10,600 lbs. yield per acre. The increase of Ratnagiri variety is significant over the local, while the difference between the other pairs are not statistically significant. Thus the results, so far as the Poona local and the Ratnagiri varieties are concerned, are conclusive.

14. *Study of farm business under dry farming conditions around Poona.*—The work mentioned on pp. 191, paragraph 15, of the last year's report is continued and is giving interesting data. This work must be carried out for a few years more to be able to draw any conclusions.

15. *Developing of higher milk yield in cows and buffaloes along with early maturity and regular calving.*—The programme laid out in 1929 for further improvement of Sindhi cows and Surti buffaloes by in-breeding, line-breeding, out-crossing and grading, was continued. There is nothing special to note as yet by way of results in this line.

16. *Requirements of concentrates of Dairy animals under Deccan conditions.*—(1) Crushed *kulthi* was compared with *tur chuni*, quantity for quantity, and it was found that both gave equally good results and none showed any bad effects. *Kulthi* however proved, at the rates current at the time of the experiment, to be 54 per cent. cheaper.

(2) *Guwar* (cluster beans) was compared with *tur chuni* with the result that there was an increase of 4 ozs. or about 2 per cent. of milk in favour of *guvar*. As regards the cost of these rations, it was found that at the rates current at the time of the experiment the *guwar* ration was cheaper by 5·28 pies per every 10 lbs. milk produced.

Both the experiments were carried out by the standard methods now current in such trials.

17. *Devising and trial of new implements—Schutte seed drill.*—This drill was further compared with the country drill and hand dibbling. With a depth of penetration of 3·54 inches the Schutte's drill showed a draft per coulter per inch of penetration of 46·4 lbs. as against 9·29 lbs. of the country drill for a depth of 4·05 inches. The distribution of seed, in *bajri*, *kulthi* and *jowar* in a larger scale trial of the Schutte drill was satisfactory, but the draft being very great the animals got exhausted very quickly. The seed hopper of the Schutte drill was required to be filled up frequently to allow even dropping. As regards gaps the Schutte drill gave 2 per cent. more than hand dibbling and 14 per cent. less than country drill. No marked difference in yield was however noticed between the crops sown with either drills, with the above differences in gapping.

Howard's "Shanti" set of implements : This combination set contains a light plow, a ridger, a three-tyne hoe, a 14-tooth spike tooth hoe, a peg tooth hoe, a light disc harrow and a seed drill, all adjustable on one frame. The plow is too light to be useful for ploughing in the Deccan. The ridger worked fairly well for small ridges; the three and fourteen tyne hoes are quite satisfactory ; the disc harrow, with the rickety frame is too light for the Deccan trap soils ; the distribution of the seed by the drill is very irregular.

18. *The influence of different kinds of preparatory tillage.*—With a view to more minutely gauge the influence of different kinds of preparatory tillage namely, plowing and further fining down the soil as against the tilth obtained by 2 or 3 turns of a blade harrow, an experiment has been undertaken with cotton and jowar crops, since the year under report. An investigation of this kind will necessarily require some years to draw any conclusions.

19. *Indore method of compost making.*—With a view to verify the experiences, both as regards processes as also cost, gained at the institute of Plant Industry at Indore, an experiment has been undertaken at the College farm under the direct charge of Mr. K. S. Kulkarny, Assistant Professor of Agriculture in collaboration with the Agricultural Chemist to the Government.

This experiment was started in March 1932, with 8 pairs of bullocks. The compost turned out is not quite as good as at Indore. Further work is still in hand,

20. *Storage of kadabi* (dry *jowar* fodder).—This experiment is a continuation of the work referred to on page 213, paragraph 14 (*b*), of the report for 1929–30, and page 191, paragraph 16, of the report for 1930–1931. The results obtained during the year show that the loss in weight at 18 months' storage comes to 22·3 per cent. while that for 24 months' storage comes to 22·14 and in volume to 17·8 per cent. and 25·5 per cent. respectively.

21. *The position of a leguminous crop in rotation.*—Though it is widely believed that leguminous crop plays an important *role* in rotations in farming, actual data of scientifically carried out investigations applicable to the Bombay Presidency are not available. An experiment has therefore been undertaken on the Agricultural College Farm since 1929–30 to study this question fully. The crops taken are *bajri* and *kulthi*.

The results of this year's work which is the first in which a comparison is possible show that *bajri* after *kulthi* gave about 24 per cent. more yield than *bajri* after *bajri*, which result is statistically significant.

22. *Other experiments.*—In addition to the above systematic experiments a number of simpler experiments were conducted by the final

year students to get practice in field experimentation work, of which the following are worth noting :—

Serial No.	Name of crop.	Nature of experiment.	Remarks.
1	Cotton ..	N. R. *vs.* Banilla (4 replications).	N. R. gave about 24 per cent. significantly more yield than Banilla. This confirms last 2 years' results.
2	Cotton ..	N. R. *vs.* Broach ..	Both have given nearly the same yield of 700 lbs. Last year Broach Cotton gave 636 lbs. as against 414 lbs. of N. R.
3	Tobacco ..	Satara *vs.* Gandio No. 6. (4 replications).	Gandio No. 6 gave about 10 per cent. more than Satara which however is not significant.

C.—*Commercial working of the College Dairy.*

23. Side by side with the primary objects of affording facilities for the practical teaching in dairying and animal husbandry to the students of the Agricultural College, as well as the operations of breeding pedigree animals of Sindhi cows and Surti buffaloes for higher performance, investigation into the scope and methods of dairying as a business concern has also been kept in view. The working of the year under report is summarised below :—

The year under report began with 218 heads of cattle and ended with 202 consisting of 23 cows, 27 young stock of cows, 63 buffaloes, 53 young buffalo stock, 5 cow-breeding bulls, 4 buffalo-breeding bulls and 27 working cattle. The decrease by 16 animals is mostly due to the sale of a larger number of animals during the year under report for an economical adjustment of the business.

The health of the animals was generally satisfactory except for foot and mouth and rinderpest epidemics, the former appearing among Manjri as well as Kirkee animals during January and February 1932 respectively, and the latter, only among Manjri stock during the month of March 1932. The buffalo stock was more susceptible to rinderpest than cows, resulting into 4 deaths in buffalo heifers and one in cows.

The following statement shows the performance of milk animals in the year under report as compared with the previous year :—

Year.	Cows.		Buffaloes.		Average annual yield of milk in lbs. per head on total.			
					Cows.		Buffaloes.	
	Total	Milking.	Total	Milking.	Actually drawn lbs.	After feeding calves.	Actually drawn lbs.	After-feeding calves.
					Lbs.	Lbs.	Lbs.	Lbs.
1930–31 ..	22·11	18·23	68·14	47·74	3,965·9	3,594·9	3,212·9	3,127·2
1931–32 ..	21·38	17·48	60·66	46·65	3,725·0	3,292·4	4,107·0	3,759·4

The decrease in the average yield per cow by 240 lbs. over that of the last year is due to (1) one cow who gave birth to a monster calf during the year and got a set back in her general health and constitution yielding 1,133 lbs. less as compared to last year; (2) one old cow having an abortion, giving 2,683 lbs. less milk as compared to her performance last year; and (3) this year's batch of new cow heifers with an average of 8 lbs. per head per day, not being so high producing as compared with the batch of the last year with a daily average of 16·8 lbs., the reasons for which cannot be traced.

In the case of buffaloes, the increase of 894 lbs. over the yield of the last year is due to (1) a reduction in the proportion of dry animals consequent on the sale of dry stock from the purchased lot, to economise on the cost of their feeding during the dry period and (2) comparatively more calvings in the early part of the year than in the previous year.

The financial aspect of the dairy business in the year of the report as compared with the previous year is shown in the statement below :—

Year.	Total milk produced.	Total milk fed to calves.	Total milk disposed off.	Cost of producing 100 lbs. of milk available for disposal.	Money realised per 100 lbs. of milk.
	lbs.	lbs.	lbs.	Rs.	Rs.
1930–31 ..	3,06,713	14,276	2,92,437	20·50	18·5
1931–32 ..	3,28,793	30,352	2,98,441	17·85	14·83

The quantity of milk fed to calves is almost double during the year due to *an increase in the number of units fed on milk*, namely, 8,957 during the year as against 3,777 of the previous year.

The cost of production is made up as under :—

Serial No.	Item.	1930–31 per 100 lbs.	1931–32 per 100 lbs.	Remarks.
1	Maintenance of stock ..	12.32	8.56	Increase during 1930–31 is due to— (*i*) Inclusion of the charges on account of Manjri young stock worth about Rs. 3,000. (*ii*) Average daily attendance of the herd being 32 more in 1930–31 than in 1931–32. (*iii*) Cheapness of concentrates. (*iv*) Re-estimation of land rent (Rs. 1,100 as against Rs. 4,000 last year.) (*v*) Charges of Rs. 1,057-14-4 on account of intra departmental supplies were not included in 1930–31.

Serial No.	Item.	1933–31 per 100 lbs.	1931–32 per 100 lbs.	Remarks.
2	Depreciation charges on— Buildings and equipment.	1·87	1·70	
	Live-stock	0·70	1·16	Increase during 1931–32 is due to more loss in sales of stock.
3	Milk delivery charges ..	1·16	1·43	Increase in 1931–32 is due to repairs and replacement of parts of motor-van falling in this year.
4	Interest charges on capital.	1·25	1·60	Increase during 1931–32 is due to interest on credits not being deducted from total interest on capital as was done last year.
5	Management charge. Pay and Travelling Allowance.	3·20	3·40	Increase during 1931–32 is due to charging 2/3rd of the whole establishment to the Dairy instead of the full, excluding the Manager in the previous year.
	Total ..	20·50	17·85	

The difference in the realisations for 100 lbs. of milk in the two years is explained by the following statement :—

Rate of milk sold per rupee.	1930–31		1931–1932		Remarks.
	Quantity out of 100 lbs.	Value in Rs.	Quantity out of 100 lbs.	Value in Rs.	
4 lbs. ..	0·02	0·005	0·02	0·005	
5 ,, ..	21·91	4·380	16·23	3·250	Owing to general cheapening of milk, the demand at 5 lbs. contracted in 1931–32.
6 ,, ..	65·28	10·876	39·87	6·640	Owing to retrenchment in their budget, the Sassoon Hospital's demand fell in 1931–32.
7 ,, ..	0·75	0·107	0·05	0·007	
7½ ,, ..	0·04	0·005	..	..	
8 ,, ..	1·06	0·132	23·31	2·910	The increase in 1931–32 is due to the surpluses resulting from the foregoing items.
9 ,, ..	0·06	0·006	..	..	
10 ,, ..	0·15	0·015	..	..	
Total milk as such.	89·27	15·526	79·48	12·812	

Rate of milk sold per rupee	1930–31		1931–32		Remarks.
	Quantity out of 100 lbs.	Value in Rs.	Quantity out of 100 lbs.	Value in Rs.	
Milk turned into and disposed of in other forms.	10·73	1·009	20·52	1·560	The increased quantity and proportionately reduced returns for 1931–32 are due to the surplus mentioned above and to conversion of the produce into ghee which fetches less than butter.
Total marketable milk.	100·00		100·00		
Interest on receipts credited into Treasury.	..	..	..	0·478	
Receipts from other than Dairy produce.		1·880	..	..	
Total ..	100·00	18·415	100·00	14·850	

The total area under fodder crops was 177 acres and 30 gunthas of which 122 acres and 10 gunthas were cropped only once, and the remaining was made up by cropping 27 acres and 30 gunthas more than once. The total fodder produced averaged 18,235 lbs. green weight per acre as against 16,850 lbs. during the previous year; the reasons for the increase in the year under report being mainly a good crop of green oats and peas which averaged 18,000 lbs. per acre in that year owing to a cooler and hence more favourable winter for its growth, as against 10,000 lbs. of last year with a much less cold causing the crop to rust.

The cost of producing 100 lbs. of green fodder works out at annas 8·05 as against 8·4 for the previous year; the less cost by 0·3 annas in 1931–32 is due to the increased yield per acre.

The area of 38 acres suitable for grazing furnished forage equivalent to a full requirement of roughage for 26 adult animals for 92 days from first week of November 1931 to the end of January 1932, as against 43 adult animals for 62 days in the previous year.

An attempt was also made to follow the compartmental grazing by rotation in four blocks on a total area of 12 acres and it carried six buffaloes for 77 days as against 7 buffaloes for 96 days for the previous year. The decrease in quantity in 1931–32 is due to poorer growth of grass.

D.—Aid and Assistance to the Public.

Supply of implements.—Requests for supply of improved implements and their spares still keep coming from various places, inside and outside the Presidency. Over 10 enquiries were replied by giving information as to the sources from which the requirements could be got, and only a few implements were made at and supplied from the farm-workshops.

Supply of seeds, manures, etc.—There were over 600 enquiries for seeds and manures of which 300 indents were supplied from the Agricultural College farm and the remaining directed to reliable sources. The seeds, as usual, chifley consisted of nilwa *jowar* for fodder, early groundnut *bajri*, *suran*, lucerne, onion and tobacco.

Services of Pedigree bulls.—During the year the Agricultural College dairy afforded the service of 25 cow bulls (Sindhi and Gir) and 32 buffalo bulls (Surti).

Help to other sections of the College.—Help in the form of growing crops, supply of labour, seeds, implements, land and advice on agricultural matters was rendered to various sections at the College, the Agricultural Engineer to Government and the Central Poultry Breeding Farm to the extent possible whenever asked for.

Supply of information to the public.—Over 260 enquiries on various agricultural questions were replied to. The number of visitors was about the same as last year, including over 400 students from different agricultural schools, Male Training College at Poona, the Female Training College, Poona, The Urdu School, Allahabad College, etc.

Publications.—The following is a list of publications during the year :—

(1) GOKHALE, V. G.—Improvement of Manat lands in the North Konkan—Bombay Agricultural Department Bulletin No. 167 of 1931.

(2) GOKHALE, V. G.—Improvement of Nagli—Elucine Corocana—Agricultural College Magazine, Vol. XXII, Nos. 2, 3 and 4.

(3) DAVE, C. N. and another.—Investigation into the fluctuations of milk yield with the advancement of lactation.—The Indian Journal of Veterinary Science and Animal Husbandry, Vol. I, Part 3, September 1931.

(4) DAVE, C. N. and another—Effect of season of calving on milk yield and calving period of Montogomery cows.—The Indian Journal of Veterinary Science and Animal Husbandry, Vol. I, Part 3, September 1931.

(5) DAVE, C. N.—Milk industry in Kaira district—Poona Agricultural College Magazine, Vol. XXIII, No. 3, December 1931.

(6) DAVE, C. N. and another—Experiment on rationing of Silage to cows.—Journal of Agriculture and Livestock, Vol. II, Part I, January 1932.

The drafts of the following leaflets of the Bombay Agricultural Department were prepared :—

(1) Improved plows.
(2) Preservation of cattle urine for manure.
(3) Practical system of storing farm-yard manure.
(4) Cultivation of potatoes in Bombay Presidency.

Nos. 1, 2 and 3 above were also translated into Marathi, Kanarese and Gujarati.

Mr. K. S. Kulkarny wrote and published a book called " Amchi Sheti " —" Our Agriculture "—in Marathi at the desire of the Vernacular Agricultural Books Committee of the Bombay Government. This excellent book has supplied a long felt want of a comprehensive volume on agriculture, including the various sciences in Marathi and has been very well reviewed in various journals.

Personal.

All the members of my staff have put in the best of their endeavours and abilities in carrying out their duties.

V. G. GOKHALE,
Professor of Agriculture.

Programme of work under the Professor of Agriculture, Agricultural College, Poona, for the year 1932-33.

I. TEACHING.

Teaching is the primary function of the staff of the Professor of Agriculture's section and this work will continue as in the last year. This will occupy about 60 per cent. of the time of the staff.

II. ADMINISTRATION.

In connection with the teaching, two large institutions, viz. the college farm and the college dairy, have to be run. The work under this section has increased steadily owing to greater and greater details in account and audit matters.

The heavy retrenchment of three graduate assistants and three non-graduate assistants from 1st March 1932, has increased the burden on the remaining staff.

III. INVESTIGATION AND RESEARCH.

Only about 10 per cent. of the time of the staff is thus available for this work. Therefore only such pieces of investigation and research

can be tackled as would be possible in such a broken up time. Subject to this limitation the following shows the programme under this head :—

A. Omissions from the programme of last year, 1931–32.

Subject	Investigator Professor of Agriculture in collaboration with	Reasons
1. Utility of weight of seed and its effect on final yield in cotton.	Mr. K. S. Kulkarny, Assistant Professor of Agriculture.	Concluded.
Vegetable work.		
2. Trying alternative cropping systems with a view to get the largest net profit.	Mr. H. M. Desai, Lecturer in Agriculture.	At the crop Research Committee meeting of April 1932 it was decided to try only one system.
Irrigation—Broad ridge *vs.* flat bed method for Suran and ginger.	Mr. H. M. Desai, Lecturer in Agriculture, and Mr. K. R. Patel, Demonstrator in Agriculture.	Concluded.
Relation of vigor of chillies seedlings to their final yield.	Do. ..	Do.
Poona *vs.* Ceylon white bunch variety of sweet Potatoes.	Do. ..	Do.
3. Determining the yield of spineless cactus at different stages.	Mr. D. B. Kolhe, Lecturer in Dairying.	Do.

B. Continuation from the programme of 1931–32.

1. Accurate preliminary testing of artificial fertilisers.	Mr. P. M. Gaiwala ..	Carried out for furth r testing.
2. *Vegetable work.* Perfecting the technique of cultivation to get the maximum yields of the best quality of produce by—	Mr. A. R. Neginhal, Lecturer in Agriculture and Superintendent, Agricultural College Farm.	Do.
(*a*) *Manuring.* Manurial requirements of Suran and ginger.	Do. ..	Do.
(*b*) *Seeds and seedlings.* Mother sets *vs.* finger sets of turmeric.	Do. ..	Do.
3. Study of dry farming as a business under Poona conditions.	Mr. R. M. Chaudhari, 1st Demonstrator in Agriculture.	To collect data over a sufficiently long period.
4. Position of a leguminous crop in a rotation.	Mr. R. S. Kittur, 2nd Demonstrator in Agriculture.	Do.
5. Collection of up-to-date information on cotton cultivation.	....	Not yet finished.

B. Continuation from the programme of 1931-32—contd.

Subject	Investigator Professor of Agriculture in collaboration with	Reasons
6. The influence of different kinds of preparatory tillage on Jowar and cotton.	Mr. R. S. Kittur, 2nd Demonstrator in Agriture.	To collect data over a sufficiently long period.
7. Development of higher milk yield in cows and buffaloes by breeding, along with early maturity and regular calving.	Mr. H. G. Baluch, Assistant Professor of Animal Husbandry and Dairying.	Not yet finished.
8. Requirements of concentrated feeds for dairy cattle in the Deccan.	Mr. D. B. Kolhe, Lecturer in Dairying and Mr. C. N. Daye, Demonstrator in Dairying.	Other concentrates to be tried.

C. Additions to the programme of the last year, 1931-32.

1. Whether gappiness is a justification for using an improved seed-drill.	Mr. K. S. Kulkarny, Assistant Professor of Agriculture.	As per directions of the Crop Research Committee of 1932.
2. *Vegetable work.*		
The most profitable scheme of vegetable growing.	Mr. A. R. Neginhal, 1st Lecturer in Agriculture.	Do.
Cut *vs.* whole set of Suran	Do.	Newly taken up.

V. G. GOKHALE,
Professor of Agriculture.

APPENDIX I.

Summary of work done under the Agricultural Chemist to Government, Bombay Presidency, Poona, for the year 1931-32.

During the year under report I was in charge of the Office and Laboratory of the Agricultural Chemist to Government, Bombay Presidency, Poona, from the 1st July 1931 to the 31st March 1932. During the remaining period, i.e. from 1st April to 30th June 1932 I was on leave and Mr. V. N. Gokhale acted in my place as Agricultural Chemist.

The work of the Agricultural Chemist falls into the following catagories :—

1. Analytical work (*a*) for the public, (*b*) for the Agricultural Department itself and also (*c*) for other Government Departments or institutions.
2. Investigation and Research Work.
3. Teaching Work at the College of Agriculture, Poona.
4. Water Finder Work.
5. General or Miscellaneous Work.

1. *Analytical Work.*

The analytical work includes analysis of samples and advice given based on the results of analysis. During the year under report the number of samples received for analysis was 735 as against 1,156 for 1930-31. It means the number was reduced nearly to two-thirds of what it was formerly. Much of this fall is in samples received from the public. In 1930-31 there were 315 samples which could have been charged fees. This year only 75 samples of this class were received from the public. The following table will give a clear idea about the reduction in the number for different samples for 1931-32 as compared with those for 1930-31 :—

Name of samples.	Received and analysed during the year 1930-31.	Received and analysed during the year 1931-32.	Remarks.
Soils	83	16	
Waters	44	17	
Oil seeds	5	..	
Foodstuffs	23	6	
Milk and milk products	28	2	
Manures	77	32	
Miscellaneous	55	2	
Total ..	315	75	

The total number of samples mentioned, namely 735, does not include any samples that were dealt with or analysed in connection with research or investigation work carried out in the Chemical Laboratory itself.

The samples received could be classified as :—Soils, 216; Waters, 98; Foodstuffs (including fruits etc.), 158; Fertilisers and other manures, 120; Milk and Milk products, 15; Oil seeds, 97; Tobacco, 17; and Miscellaneous; 14.

The fees charged to the public for analytical work amounted to Rs. 430.

2. *Investigation Work.*

Investigations of small problems referred to the Agricultural Chemist are included under analytical work and it is only the larger and definite problems that are included under investigational work :—

1. The second paper on the results of the laboratory investigation of the nitrogen fixation by the soils of the Bombay Presidency was sent for publication in 1930-31 and was published in December 1931 in the Indian Journal of Agricultural Science.

2. A third paper on nitrogen fixation dealing with field experiments has been written in collaboration with Mr. N. V. Kanitkar, Soil Physicist to Government, Bombay Presidency, and is now sent for publication. The investigation in this connection reveals some important relations between the conditions of the soil and soil nitrogen.

3. The work on the movement of manures in soils started some three years ago was completed in the year under report and the results are being put together for publication.

4. Some work was done on the decomposition of oil-cakes when put into the soil as manures. The results are nearly ready and will be put together for publication in due course.

5. Investigation regarding the disintegration of bones was completed in the year under report and the results have been sent to the Imperial Council of Agricultural Research for being considered by their Fertilisers Committee.

6. The study of the "Digestibility of Starch" from different types of rice and other seeds which was started some two years ago is not yet complete. It is hoped that the work will be completed in the year 1932-33.

7. Compost-making from Farm residues was transferred to the Assistant Professor of Agriculture. The necessary help from the chemical point of view is being given all along.

3. *Teaching.*

I am responsible for teaching of Chemistry and Geology to all the classes of the Poona Agricultural College. As indicated in previous years, there is too much work for the Chemistry section and an additional lecturer is necessary but unfortunately instead of sanctioning this, one member of the existing staff has been temporarily retrenched. I hope that either the necessary staff will be given or the admission to the College will be severely retrenched.

During the year under report I had two post-graduate students working for the M.Ag. examination of the Bombay University. One of these has now submitted his thesis and the other expects to do so in June 1933.

4. *Water Finder Work.*

In 1930-31 three out of the four workers were retrenched and therefore in the year under report water finder work was done by only one assistant and that too from November to the end of February as at this stage even the remaining post was retrenched. During this period 121 sites were examined. Seventeen of these sites indicated underground water.

The closing down of the water finder work requires me to take a very short review of this activity.

It was in 1909 that a water finder machine was first obtained for trials. Mr. H. K. Mehta who was then Assistant Professor of Physics worked on it. His results were published in the Departmental Bulletin No. 72 of 1915. The work was then transferred to the Agricultural Chemist, who regularised it and put one of his assistants to work on the machine whenever it was required by the public. The work was done without any fees. In 1922 fees were introduced according to the scale sanctioned by the Government. On this account the demand for the use of the machine slightly went down. In 1923-24 the demand began to increase and went up rapidly after that. In 1924 a special assistant in charge of the machine was sanctioned. A second assistant was appointed in 1925, a third one in 1926 and a fourth one in 1928. One of the assistants was specially meant to help Major Pogson by testing his sites when he was appointed as Water Diviner to the Government of Bombay. Three of the posts for the water finder were retrenched in March 1931 and the remaining in March 1932.

In order to get an idea about the work done and the subsidy borne by Government in this connection the following table has been prepared.

I have taken 7 months as the working season and divided the pay and travelling expenses of the assistant and the peon by the number of sites examined. Holidays, days lost in travelling or on account of clouds, cannot be separated and have been taken as working days. During Major Pogson's time expenses have been divided between his work and the work for the public according to the number of sites tested :—

Year.	Number of sites tested in in 7 months.	Pay and travelling allowance of graduate assistants and peons for 7 months.	Cost per site.	Fees paid by owner.	Balance, i.e. subsidy borne by Government each year.
		Rs.	Rs.	Rs.	Rs.
1922-23	131	1,450	11	250	1,200
1923-24	218	1,570	7	350	1,220
1924-25	284	1,720	6	390	1,330
1925-26	332	2,075	6	845	1,230
1926-27	424	2,535	6	1,044	1,491
1927-28	229	1,390	6	470	920
1928-29	402	2,450	6	840	1,610
1929-30	746	4,568	6	1,516	3,052
1930-31	115	1,216	10	260	956
1931-32	121	862	7	210	652

In addition to these, work was done for Major Pogson as follows :—

Year.	Number of sites.
1925-26	159
1926-27	71
1927-28	112
1928-29	35

A revised edition of Bulletin No. 72 was published in 1925 jointly by Dr. H. H. Mann and myself. A good deal of experience was gained during the intensive work after 1925 and a further revised edition on the water finder Bulletin was brought out by me. It gives new information with regard to the selection of sites and also detailed information about the wells dug.

One of the water finders has been sold to the Mangrol State and one has been lent to the Deccan Agricultural Association, Poona.

Staff.

The retrenchment axe has fallen very heavily on the Chemistry Section. All the four assistants under the water finder work have been cut off. They used to render help in analysing samples when they were not out of Poona for duty. That help is now gone for ever. One of the junior assistants is also retrenched. This makes it very difficult to cope with the analytical work. I have already referred to the cut of one assistant under teaching. All this wholesale cut makes it extremely difficult to carry on routine work, much less take up any research work. We always had two or three good problems on hand under investigation and I felt proud that with hard work we were able to carry on research along with the heavy routine duties. With the changed circumstances now, I doubt very much whether we shall be able to keep up to the former standard.

In closing this report I must say that all my assistants rendered loyal co-operation in carrying out the work of my section.

D. L. SAHASRABUDDHE,
Agricultural Chemist to Government,
Bombay Presidency, Poona.

Poona, 15th July 1932.

Programme of Investigation Work under the Agricultural Chemist to Government for 1932-33.

Due to retrenchment in the staff very little research work can be taken up. The following problems will be dealt with according to the time available :—

1. Manurial constituents assimilated by crops.
2. Digestibility of the starch from rice and other grains.
3. A field study of nitrogen fixation by soils will be taken up only if funds are made available.
4. Necessary help in conducting the manurial experiments on rice at Karjat.

D. H. SAHASRABUDDHE,
Agricultural Chemist to Government,
Bombay Presidency, Poona.

Poona, 19th July 1932.

APPENDIX J.

Summary of Work done under the Economic Botanist to Government, Bombay, Poona, for the year 1931-32.

During the year under report Dr. W. Burns held charge of the post of the Economic Botanist up to 29th April 1932, when he proceeded on leave. In his absence Mr. L. S. S. Kumar, Assistant Professor of Botany, acted as Economic Botanist. Mr. L. B. Kulkarni, Assistant Economic Botanist retired from service from 23rd February 1932 after having served in this department for over twenty-four years. During his period of service Mr. Kulkarni worked first on Horticultural and later mainly on grasslands problems, and contributed a number of articles to various journals including the Poona agricultural college magazine. Due to retrenchment the Economic Botanist has lost the posts of two Assistant Economic Botanists (graduates) and of one Plant Collector (non-graduate).

Bajri research.

The work of breeding bajri (*Pennisetum typhoideum*) in Poona under the Economic Botanist has been finally wound up and transferred to Niphad, in Khandesh, where it will be continued by the Crop Botanist. The reason for this transfer being that Nasik district having the largest bajri growing tract in the presidency, it was deemed advisable to locate the work within the tract rather than outside it. Up till now bajri research has been financed by Sir Sassoon David Trust Funds, henceforth the expenses will be met by the department. The Economic Botanist still retains that portion of bajri work which consists in producing selfed seeds of varieties 37, 54 and 59 for maintaining them as very useful selections. In addition he retains control of an experiment to test the merit of growing a mixture of varieties against single varieties. In accordance with the decision arrived at the Crop Research Committee Meeting of April 1932, preliminary trials of growing a mixture of varieties 37, 54, and 59 to test its performance, against individual varieties and the local will be conducted for a period of three years on the College Farm, by the Economic Botanist in co-operation with the Professor of Agriculture. Simultaneously village trials of a similar type are being arranged for in co-operation with Deputy Director of Agriculture, S. C. D., Poona. From these trials it is hoped to determine the advantage or otherwise of growing a mixture over any single variety suitable for the Poona tract.

Grass research.

The experiments on rotational grazing at Bhamburda ceased from the end of December 1931 when the result obtained confirmed those of previous years. As a result of Bhamburda experiment, rotational grazing on a much larger scale has been undertaken in co-operation with Mr. E. A. Garland, Divisional Forest Officer, Working Plans, Central Circle, Poona, at Wadki near Diva Ghat on the way to Saswad. The area available for grazing is about 500 acres with about 150 animals to graze. The experiment is in its first year.

Under instructions from the Director of Agriculture the Bhamburda area has been handed over to Professor of Agriculture for grazing dry buffaloes from the College Dairy. The system of rotational grazing will be continued on smaller blocks with more intensive grazing.

At Kandivlee silage making and rotational grazing continued, the results being the same as previous years.

Cytological work.

A new line of work has been introduced into this section by commencing investigation along cytological lines. At first the investigations will consist mainly in working out the cytology of some commonly known plants and towards improving the technique. Later this idea will be applied to work on some of the economically important crops to aid in a proper interpretation of their genetic problems. The importance of cytology in investigations of plant breeding cannot be too highly stressed. Therefore an attempt to begin work along cytological lines has been commenced and will be pursued further.

Botanical teaching.

At the commencement of the teaching session eleven students were enrolled for the Optional Plant Breeding course. Of these, one dropped out very early and of the remaining ten, seven have successfully passed the B.Ag. examination. The work of teaching for the first and second years has progressed satisfactorily. The draft of a new curriculum for the agricultural degree has been decided on by the Board of Studies in agriculture and put before the University for consideration. The new curriculum contains much better provision for the teaching of botany, cytology, histology and plant physiology and will certainly be a better training in the fundamentals of botanical science.

Seed testing.

The total number of samples of seed tested were 303.

Miscellaneous.

A large number of enquiries have been attended to and requests for identification of numerous specimens complied with. Enquiries for supply of seeds have received attention. There has been a great wave of interest in "*Ishabgol*" the seed of *Plantago psyllium* used as a remedy for dysentery, and also in the cashew nut. The total number of specimens identified during the year were *273*.

As growing spineless cactus is not an economical proposition such plants as were growing in Economic Botanist's area have been removed and the area will be utilised for other cultivation.

During the year Dr. Burns toured all the farms where plant breeding work is being carried out to supervise and give advice.

In connection with the heavy damage caused to jowar crop by the attack of Striga, experiments to determine the conditions of germination and methods of infection have been undertaken by Mr. L. S. S. Kumar, Assistant Professor of Botany.

Publications.

The following publications were contributed by the Economic Botanist and the members of the staff :—

No.	Title.	Publication.	Author.
1	An experiment in the improvement of Forest Grassland.	Published in the Indian Forester, Forest Research Institute, Dehra Dun, Vol. LVII, December 1931.	W. Burns.
2	Work of Bombay cotton breeders.	Agriculture and live stock in India, Vol. I, Part V, September 1931.	W. Burns.
3	Kuran Va Kuranaanchi Sudharana (Marathi).	Gowrakshan, special number, December 1931.	L. B. Kulkarni and S. R. Godbole.
4	Note on pollination in Bajri (*pennisetum typhoideum*).	Agriculture and live stock in India, Vol. II, Part I, January 1932.	D. B. Barve.
5	Grassland problems in western India.	(To be published shortly.)	W. Burns, L. B. Kulkarni and S. R. Godbole.
6	Castor breeding in the Bombay Presidency.	To be published in agriculture and live stock in India.	N. G. Masur.

L. S. S. KUMAR,

Acting Economic Botanist to Government,
Bombay.

Programme of Work for the year 1932-33 under the Economic Botanist to Government, Bombay, Poona.

1. *Enquiries.*—The Economic Botanist and his staff will attend to all enquiries and give the necessary advice and information to the public in such matters.

2. *Research*—(*a*) *Bajri.*—An experiment to determine the performance in yield of sowing a mixture of selected strains of bajri 37, 54 and 59, as against individual strains as per Latin Square method will be conducted.

Village trials to test the advantages of sowing a mixture of selections against individual local strains will be arranged for.

(*b*) *Grass.*—The experiment on rotational grazing on an enlarged scale at Wadki near Diva Ghat will be continued.

Supervising the grazing experiment, silage and hay-making at Kandivlee will take place.

(*c*) *Cytology.*—Mr. Kumar will continue the work on the cytology of bajri and lintless cotton (mutant) in addition to the work on Sterile 1027 A. L. F. cotton.

(*d*) *Striga.*—Mr. Kumar will commence work on "the relation of temperature, moisture and oxygen to the germination of Striga seed".

3. *Miscellaneous.*—Whenever possible work to replace old and worn out specimens from the Herbarium collection by fresh ones will be undertaken in addition to collection of new specimens from time to time.

Clearing of spineless cactus from the area under the Economic Botanist's charge and planting instead with trees of botanical interest for purposes of teaching will be undertaken.

L. S. S. KUMAR,

Acting Economic Botanist to Government,
Bombay.

APPENDIX K.

Summary of Work done under the Crop Botanist to Government of Bombay, Karjat, Kolaba, for the Year 1931-32.

During the year under report Mr. B. S. Kadam held the charge of the section of the Crop Botanist. The headquarters of the Crop Botanist were transferred from Poona to Karjat during August 1931.

Mr. V. L. Bhosekar was in charge of the Rice Breeding station, Karjat, until June 1931, when he went on nine months leave on medical certificate. His vacancy remained unfilled. Mr. G. G. Patil, senior non-graduate assistant, in addition to his own duties was in charge of the station until the return of Mr. Bhosekar in March 1932. Mr. Patil ably carried out scientific instructions issued from time to time and administered the farm efficiently. In May 1932, Mr. V. K. Patankar, formerly superintendent of the Ratnagiri Farm, was appointed superintendent at the Karjat Farm, *vice* Mr. Bhosekar on deputation to the Indian Central Cotton Committee.

In October 1931 the Wheat Breeding station was shifted from the Ganeshkhind Botanical Gardens, Kirkee, to the Departmental lands at Kundewadi, taluka Niphad, district Nasik. Mr. B. Nazareth continued to be in charge of the wheat work.

The work on the improvement of bajri, which was being financed by the Sir David Sassoon Trust Fund and conducted by the Economic Botanist to Government, was transferred to this section in May 1932. The investigation in bajri will now be financed by the Government and will be carried at the Cereal Breeding station at Niphad. Mr. D. B. Barve has been appointed as the acting graduate assistant, in charge bajri breeding.

Rice Breeding.

Season.

The monsoon opened with heavy showers on the 13th of June. On the same day sowing commenced and lasted until next day. The rains ceased abruptly and there was a break of ten days adversely affecting germination which caused gaps in seed-beds. The seedlings had to be irrigated until the onset of the monsoon again.

The rainfall during the month of June was deficient; but during the next two months incessant heavy rains were experienced. The monsoon became moderate during the first fortnight of September but soon after started with refreshed vigour causing great damage to the ripe crop in the fields. The continuous rains during the growing season and lack of sufficient sunshine reduced tillering of the rice crop. In addition to the damage sustained by both the early and the late strains due to heavy rain at the flowering time the crops suffered in yield due to lodging and shedding. The yield is estimated to be about 25 per cent. less than the normal.

The total precipitation for the season was 185·35 inches, slightly less than the record rainfall of 185·75 inches during the year 1896.

Season plot of K42.

The plot which has been in use for the last twelve years has been found to be very uneven in soil fertility. The previous arrangement of planting had, therefore, to be modified. The transplanting was in alternate strips of six and ten seedlings per hill along the length of the plot. The average calculated yields per acre of the two treatments are 2,191 and 2,216 lbs. respectively. The ratio of grain to straw is 1 : 1·11.

Hybridized selections.

Strain K401.—During the year under report fourteen selections were grown and six have been found to breed true to agronomic characters. All of these are surprisingly alike. These will be tested in row trials next year. Some late flowering types have been isolated from this strain.

Strain K403.—Out of the five selections secured last year two have proved to be definitely superior. These are very fine grained in contrast to the standard mid-late strain K153. The two selections will be tested further next year.

Crosses 36, 48 and 50.—From these crosses, a number of pure selections have been obtained. These will be tested in rows next year.

Replication results.

Early Kolamba strains.—The early Kolamba strains K79, K401, 10/342, 36/424 and the local Ghosalwel were replicated five times. The results were not significant. The strain K401 was impure for flowering. Due to rains at the time of flowering and harvesting the experiment was vitiated to a certain extent.

Mid-late Kolamba strains.—In the ten replication test the local variety Halwar showed significant difference over the standard mid-late strain K153 and the new synthetic Kolamba selections 403/38-130 and 403/38-200. Halwar, however, is a very coarse variety as compared to Kolamba strains.

Late Kolamba strains.—The experiment was replicated ten times. The strains K42, K226 and 50/14-20 are significantly superior in yield over the general mean. The strain 48/932-40 is inferior.

Bhadas replications.—The strains B52, B221, B255 and Bhadas local were replicated eight times. None of the strains are superior to the local this year. Unfortunately, the results have been conflicting every year and the experiment will have to be repeated.

The district trials of the three strains will be conducted from next year with a view to select the best strain of the lot.

Improvement of Zinya.

During the year under report the replication of the Zinya strains was discontinued as none of them were found to be superior to the Zinya local.

As per decision of the Crop Research Committee held in May 1931 new Zinya material has been collected from the Palghar and the Wada talukas of Thana district*. Out of the 500 selections obtained about 300 have been retained as desirable for growing next year.

Moth reaction of early strains.

There was no appreciable difference between the selected and the common material from the strains K79 and K184. The incidence of attack in the K79 selections varies from 67 per cent. to 73 per cent. and the average is 70 per cent. The unselected material was affected to the extent of 80 per cent. The selections from K184 were damaged to the extent of 39 to 50 per cent.; the check showed an attack of 43 per cent. The experiment will be discontinued from next year.

Milling tests.

Among the early strains K79 and K184 yielded 61 per cent. and 45 per cent. of whole rice. The strain K401 was dropped from the test as it showed impurities in flowering. The mid-late strains K153 gave 50 per cent. of whole rice and the late strains K42, K412 both milled 53 per cent. each and K226 58 per cent. of whole rice. On the whole the strains have shown better performance than last year.

District trials.

Trials in Nasik. –The early strains K79 and K184 and the late strains K42 and K412 were tried at various places in the Igatpuri taluka of Nasik district. The local check varieties were early Varangal and late Kolapi. None of the strains have done better than the local varieties this year. However, the Kolamba strains being finer and more uniform fetch Rs. 2 more per candy than the local rices. In this tract the Kolamba strains have shown higher proportions of straw to grain.

Trials in Nagar. –The two early and the late strain K42 were compared at various places in the Rajur village of Akola taluka. The strains K79 and K184 gave appreciably higher yields than the local Jirwel. The late strain K42 has not done well this year having suffered from the late rains.

Quantity of seed distributed.

Out of the total quantity of 1,800 lbs. of seed of various strains the Deputy Director of Agriculture, Konkan division, was supplied 1,105 lbs. of seed for distribution. He was also supplied bagged seed of various strains for multiplication.

* Thanks are due to Mr. K. B. Modi, B.Ag., District Agricultural Overseer, Palghar, who rendered valuable assistance in collecting samples of Zinya rice.

Wheat Breeding.

The wheat breeding station which had been located at the Ganeshkhind Botanical gardens, Kirkee, for the last twelve years was transferred in October 1931 to Niphad in the Nasik district. This step, long overdue, was at last taken in view of the general feeling that wheat breeding had not only suffered at Kirkee but has hardly any possibility of expansion in future if it is not shifted to its proper locality. The farm is now located in the village Kundewadi, along the Niphad-Pimpalgaon (Baswant) road and can be reached in a few minutes from the Niphad railway station.

The Niphad taluka is a leading dry wheat producing taluka in the Nasik district, which claims nearly 25 per cent. of the entire wheat area in the presidency proper.

The soil is deep black, well suited to dry farming as it has a good water holding capacity.

The average rainfall at Niphad is about 30 inches. This year's precipitation has been favourable. The rains continued throughout October delaying sowing, which was commenced on the 30th of October. On the 4th of November it rained heavily ; and sowing had to be postponed for a fortnight.

The early sown wheats escaped rust attack, but the late sown material was attacked during the milk stage.

Replication results.

The standard Bansi strains were replicated six times along with Pusa4 and Niphad local obtained from one of the best farmers. The experiment showed significant results. The strains 103, 168 and the local were superior in yield over the other strains. The latter, however, contained mixture of various types of grain with poor lustre. The calculated yields per acre of each strain were as follows :—

Strain	103	162	168	224	Pusa4	Local
Yield per acre in lbs. ..	910	895	875	801	597	864

Pusa4 showed attractive appearance in the field, but yielded poorly.

Another set of replication consisted of synthetic strains derived from the crosses of improved Bansi strains and the Kala-Khapali 568. These have been designated as Bansipli [Bansi + (Kha) pali.]

The Bansipli strains were replicated six times along with Pusa4 and the Niphad local in strips of one guntha each. The strains 809, 806 and the local were significantly superior to the general mean. The following yields per acre (calculated) were obtained : —

Bansipali strains ..	806	807	808	809	907	Pusa4	Local
Yield per acre in lbs. ..	785	760	740	834	658	670	815

It will be seen that the strain 907 and Pusa4 are much poor in yield. The former will be discarded as it has proved not only to be a poor yielder but possesses unattractive grain lustre also.

Improvement of Baxi wheat.

During the year under report F_3 generation of the cross of Kala-Khapali and S.P. 33 was grown. Due to late rains the sowing was delayed and it was not possible to obtain normal estimates of the various cultures. The material will be carried further for selection next year.

Hybrid material.

Forty-nine selections were grown from the F_3 material of the Bansi-Kala Khapali crosses. Some of these are earlier than the earliest strain 808. Unfortunately, the cultures were attacked by rust more or less and it has not been possible to obtain comparable yield results. All of these will be grown next year for further study.

District trials.

Trials in Nasik.—Trials were conducted at Sinner, Ozar and Pimpalgaon (Baswant). The two Bansipali strains 808 and 809 were compared with Pusa4 and local Bansi wheat. No irrigation was given as the season was favourable. The strain 808, with an average of 829 lbs. per acre, out-yielded other wheats. The strains 809, Pusa4 and the local showed averages of 700, 640 and 507 lbs. per acre respectively. Every where the strain 808 has made a good impression and it is estimated that due to its large size of grain and attractive lustre it will fetch a premium of Rs. 1-4-0 to 2 more per 240 lbs.

Trials in Nagar.—The strain 809 was tried in the village Kharekarjune and has impressed the farmers due to its higher yield and uniform grain size and good lustre. Unfortunately, both the improved and the local wheats were stacked in one pile and the results for this year are not available.

Spread of improved strains.

Strain 162.—This strain is very much appreciated in East Khandesh and has spread over 600 acres on the North side of Gomi river in Shahada.

Strain 168.—This improved Bansi wheat has proved suitable for the south side of Gomi river. It is largely in demand there.

Strain 224.—In West Khandesh and in the Bhal tract of Gujarat this strain is spreading and is very much in demand.

The multiplication of all these strains has been undertaken by the Deputy Director of Agriculture, North Central division, at the Jalgaon farm.

BAJRI BREEDING.

As per decision of the Crop Research committee held in May 1931 the work on breeding of bajri was transferred to Niphad in May 1932.

The Poona material consisting of strains 54, 37, 59 and other selections will be continued at Niphad. A number of fresh samples have been obtained from various bajri centres, mostly of North and South Central divisions of the Presidency.

Unfortunately, most of the samples received are rains spoiled, but best of these will be grown next year and fresh ones added every year to keep up a fairly large field for selection.

Publications.

1. KADAM, B. S.—Mutation in rice, Nature 129 : 616–617, 1932.

2. KADAM, B. S. & B. NAZARETH—Inheritance of awn colour in wheat. Indian, Jour. Agric. Sci. 1 (4) : 663–670, 1931.

3. NAZARETH, B.—Bansi wheat of the Bombay Deccan and its improvement : Bombay Dept. Agric. Bull. 166, 1931.

B. S. KADAM,

Crop Botanist to Government,

Karjat, Kolaba, 9th August 1932. Bombay.

Programme of Work under the Crop Botanist to Government, Karjat, Kolaba, for 1932–33.

The Rice Breeding Station, Karjat.

I.—Season plot of K42.

II.—Selections from hybridized material.

III.—Reselections from strain K401.

IV.—Intensive study of various strains.

V.—Replication of improved strains.

(*a*) Kolamba early, mid-late, and late strains.

(*b*) Replication of Bhadas strains.

VI.—Zinya selections.

VII.—Milling tests of various improved strains.

Programme of Work in Cereal Breeding for the year 1932–33.

I.—Replication of Bansi and " Bansipali " strains.

II.—Intensive study and row trials of promising cultures from Bansi Khapali crosses.

III.—Row trials of promising cultures from Baxi-Khapali crosses.

IV.—Intensive study of standard strains.

V.—District trials.

APPENDIX L.

Summary of Work done under the Plant Pathologist to Government, Bombay Presidency, Poona, for the year 1931-32.

During the year under report Dr. B. N. Uppal held the charge of the section of Plant Pathology.

Dr. M. K. Patel was appointed Assistant Professor of Mycology, and joined his duties on 8th June 1931. Dr. Patel had a distinguished career in the United States of America, where he was engaged in research on bacterial diseases of plants for a number of years. The results of his researches, which have been published in well known scientific journals, are of outstanding merit.

Mr. M. K. Desai continued to act as Assistant Mycologist *vice* Mr. M. N. Kamat, who has proceeded to the United States of America on a leave of absence for about two years for advanced study in plant pathology. Mr. Kamat is studying under Dr. E. C. Stakman of the University of Minnesota, the well known authority on cereal rusts in America.

Mr. J. S. Malelu remained on deputation as Betelvine Investigator with headquarters at Bassein. Mr. Malelu is engaged in devising practical measures for the control of wilt in betel vines.

Mr. N. T. Kulkarni continued to work as Sann Investigator in connection with an investigation into the wilt in sann hemp financed from the Sir Sassoon David Trust Funds.

Education.

The Plant Pathologist to Government was assisted by the Assistant Professor of Mycology in the teaching of plant pathology at the College of Agriculture.

Only two out of the five students specialising in advanced plant pathology were successful in the University examination for the degree of Bachelor of Agriculture. There is one post-graduate student under training. Applications for admission to the post-graduate course in mycology could not be considered because of limited facilities.

Miss C. K. Kausalya, Professor of Natural Science, Queen Mary's College, Madras, worked in this section in June and July. She was engaged in learning the general technique of plant pathological research.

Research.

1. *Wilt in betel vines.*—The conditions for the development of wilt in betel vines, caused by *Phytophthora sp.*, were so favourable during the monsoon that the disease broke out in a virulent form, and in many cases completely destroyed the plantations.

A large number of plots were treated with Bordeaux mixture 2-2-50 at the rate of 2 gallons per 10-foot row (*harat*). The programme of treatment was as follows :—

Treatment	Time of application
First	.. Just before planting in October-November.
Second	.. Before the vines are lowered in late May.
Third	.. About the first week of July.
Fourth	.. About the first week of August.
Fifth	.. About the first week of September.

At the end of the rains all the treated plots which were lowered in May, remained free from the disease. It was, however, noted that, if vines are not lowered in May, the treatment is ineffective in controlling the disease. It seems that the operation involved in the lowering of vines so improves the condition of the soil that Bordeaux mixture can penetrate below the surface of the soil and thus kill the fungus.

Field treatments are also being made with a view to ascertaining whether it is possible to reduce further (1) the number of treatments required for effective control, and (2) the quantity of fungicide required for each treatment. Experiments are also being made to substitute an artificial fertiliser for castor cake, since the latter is known to favour the development of the fungus in the soil.

The results on the treatment of betel vine plantations with "Kerol", a proprietary compound, are not yet available.

2. *Powdery mildew of cumin.*—The work done during the year was to test the value of one application of sulphur as against two applications for the control of mildew, and to study the life history and morphology of the fungus.

It has been ascertained that one application of sulphur made at about the time of flowering gives complete control of mildew. The quantity of sulphur required per acre is about 25 lb., and the cost of treatment comes to about Rs. 2-4-0.

It has also been shown that the fungus perennates by means of hibernating mycelium on the seed.

The morphology of the fungus has been studied, and from the data it appears that the fungus causing powdery mildew of cumin should be referred to *Erysiphe polygoni* DC. Cumin is thus a new host of this species.

3. *Fusarium wilt of sann-hemp.*—The results of a large number of experiments indicate that the wilt is distributed throughout the Presidency, and that the fungus is not split into specialised races.

The work done during the year further indicates that sann-hemp is practically self-sterile, and in nature pollination is mainly effected by the carpenter bees.

The seed from field-selected resistant plants (selected during the last two years) was grown in a heavily infested seed-bed in the plant house. Out of 814 plants grown under these conditions, only 30 resisted the attack of wilt. A method has been worked out by which it is possible to tell a diseased plant before it flowers or shows any external signs of wilt. The 30 surviving plants were selfed; but only 16 plants produced a few seed each. In bagged flowers stimulation by insects was more effective in producing seed than by a camel's hair brush.

It will be seen from the above account that since sann-hemp is highly cross fertilised, the problem of producing seed in bags has become very difficult. It is proposed to get over this difficulty by a "sib" cross. The object of the study is to secure homozygous resistant plants. Arrangements are being made for installing soil-temperature tanks to test resistance in selected plants, since it is impossible to select homozygous resistant plants in the field because of variations in soil infestation and in seasonal climatic conditions.

4. *Rhizoctonia disease of jowar.*—It has been shown that *Rhizoctonia bataticola* (=*Macrophomina phaseoli*) isolated from jowar can cause infection of this host when the moisture content of the soil in which the plants are grown is 60 per cent. Another strain of this fungus isolated from cotton did not produce disease in jowar under any conditions.

The disease is assuming considerable importance in the Bombay Presidency, and becomes virulent when late rains are received in November in heavy quantities. As far as we are aware, this is the first record of sorghum being a host of *Rhizoctonia bataticola*.

Further work on this disease is in progress.

5. *Powdery mildew of peas.*—It has been shown that one application of sulphur made about the time of flowering will give complete control of the mildew of peas. However, if another dusting is necessary, it should be given when the pods are formed and are flat. The cost of one application comes to about Rs. 2, and the quantity of sulphur required per acre is about 25 lb.

6. *Alternaria blight of cumin.*—In cross inoculation experiments *Alternaria sp.*, which is probably new to science, did not produce infection in *Foenicolum vulgare* or *Coriandrum sativum*. The incubation period of the fungus on cumin is three days, and the inoculated plants collapse within seven days.

The food requirements of the fungus have been studied. The work on morphology, overwintering, etc., of the causative organism is in progress.

7. *Fig rust.*—The results of the experiments conducted during the year may be summarised as follows:—

(1) 50-50, 60-40 and 70-30 sulphur-talc mixtures were ineffective in controlling infection when 65 lb. of the material were used for 5 applications.

(2) The fungicidal value of sulphur was not much impaired by the admixture of sulphur with talc up to 20 per cent. of the weight of free sulphur in the mixture.

(3) The results also indicate that 65 lb. of sulphur for 5 applications was below the "critical" quantity required for effective control. It seems that it is not safe to use less than 100 lb. of sulphur for the effective control of rust.

(4) Infection studies have shown that the incubation period of the fungus is 14 days. Cross inoculations have also been made.

8. *Studies in the genus Sclerospora.*—The Sclerospora on jowar has been redescribed as a new species, *Sclerospora sorghi* (Kulk.) Weston and Uppal. The results of this study have been submitted for publication in a foreign journal.

Another publication dealing with the host range of the Sclerospora on jowar has been accepted for publication. The results show that the sorghum Sclerospora can attack maize and *Euchlaena mexicana*.

It has been shown that *Sclerospora graminicola* is split into specialised races: one physiologic form attacks bajri and the other is found on *Setaria spp.* and *Euchlaena mexicana*. The results have been submitted for publication.

The work on *Sclerospora indica* Butler and *Scl. philippinensis* will soon be written up for publication.

9. *Relation of soil moisture to incidence of smut infection.*—It has been shown that, given the suitable temperature conditions, infection of jowar by grain smut will take place only within a range of soil moistures from 40 to 70 per cent., the 60 per cent. moisture being the most suitable for infection. These results thus indicate that, if jowar is sown early in the monsoon when there is enough moisture in the soil for the germination of seed but not enough for spores to germinate, the incidence of infection will be low.

10. *Virus diseases of plants.*—The scheme on the virus diseases of plants sanctioned by the Imperial Council of Agricultural Research, has temporarily been suspended on account of financial stringency.

11. *Black stem rust of wheat.*—In co-operative studies with Dr. K. C. Mehta, stationary slide exposures made in the period from October 1931 to January 1932, have confirmed the observations made by me during the last four years that black stem rust appears in the Karnatak as early as the middle of November, thus indicating the possibility of black rust oversummering in the Western ghats, since this rust does not make its appearance in the north of the country before the last week of December.

A scheme on the investigation of physiologic forms of black stem rust has been put up before the Imperial Council of Agricultural Research for a subvention.

12. *Bacteriophage.*—An interesting piece of research has been undertaken on bacteriophage in plant bacterial pathogens. It is encouraging to record that a race of bacteriophage specific for *Pseudomonas citri*, the

cause of citrus canker in the Bombay Presidency, has been isolated. Further work is in progress.

This problem assumes an importance in view of the research on virus diseases of plants sanctioned by the Imperial Council of Agricultural Research, since some of the recent investigations indicate a probable relationship between the behaviour of a bacteriophage and that of a plant virus.

13. *Sclerotium rolfsii in potatoes.*—Experiments on the control of *Sclerotium rolfsii* in potatoes by the application of Ceresan dust around the bases of plants gave inconclusive results. These experiments will be repeated next year.

Advisory work.

A large number of enquiries on plant diseases were dealt with during the year, and advice was given promptly whenever required.

Arrangements to demonstrate specimens of plant diseases and the appliances for their control were made at the agricultural shows in collaboration with the Divisional Deputy Directors of Agriculture.

The plant disease survey of the Presidency is being made, and it is proposed to issue, in the near future, a list of the fungi of the Bombay Presidency in the form of a Departmental bulletin.

Miscellaneous.

On account of late rains received in heavy quantities in November, extensive damage to jowar was again caused by *Rhizoctonia bataticola* in the Sholapur District. These late rains were also responsible for a severe outbreak of downy mildew in Nasik and other grape centres. The gardens in which the vines were pruned out in the first fortnight of October and which had received one application of Bordeaux mixture, were saved from the disastrous effect of the disease. The vines in the Godrej vineyard at Nasik comprising an area of about 25 acres were treated in accordance with the recommendations of the Department, and, in spite of the abnormal weather conditions, a bumper harvest was obtained.

There was a serious outbreak of black stem rust of wheat in the Karnatak.

In the Kaira District powdery mildew caused considerable damage to cumin (Jiru) crop.

Sclerotium rolfsii has been reported, for the first time, on cotton in the Bombay Presidency.

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3. Uppal, B. N. *Rhizoctonia bataticola* on sorghum in the Bombay Presidency. Internat. Bull. of Plant Protect. 5 : 163. 1931.

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5. Weston, W. H., and B. N. Uppal. The basis of *Sclerospora sorghi* as a species. (In press).

6. Uppal, B. N., and M. K. Desai. Two new hosts of the Downy mildew of surghum in Bombay. (In press).

7. Control of citrus gummosis. Bombay Dept. Agr. Leaflet No. 7 of 1931.

8. Grape diseases in the Bombay Presidency. Bombay Dept. Agr. Leaflet No. 8 of 1931.

B. N. UPPAL,
Plant Pathologist to Government,
Bombay Presidency.

Programme of work under the Plant Pathologist to Government, Poona, for the year 1932–33.

(1) *Betelvine wilt.*—Field experiments will be made to ascertain whether it is possible to reduce further (1) the number of treatments required for effective control, and (2) the quantity of fungicide required for each treatment.

(2) *Fusarium wilt of sann-hemp.*—Selection of resistant varieties of sann-hemp under controlled conditions of soil temperature will be made.

The relation of soil temperature and soil moisture to development of wilt will be studied under controlled conditions.

The relation of seed to infection will be further investigated.

The morphology and physiology of the fungus causing wilt will be studied.

(3) *Rhizoctonia disease of jowar.*—The relation of soil moisture and soil temperature will be further investigated.

Cross inoculation experiments will be attempted with cotton, groundnut and other hosts.

(4) *Powdery mildew of peas.*—The value of one dusting at the time of flowering will be further tested on a large scale.

(5) *Alternaria blight of cumin.*—Cross inoculation experiments will be made.

Experiments will be made to ascertain whether the disease is seed borne or overwinters in the soil.

The morphology and food relations of the fungus will be further tested.

(6) *Fig rust.*—The " critical " quantity of sulphur required for effective control will be investigated.

Experiments will also be made on (*i*) appropriate interval between applications, and (*ii*) the admixture of sulphur will inert substances.

(7) *Relation of soil moisture to smut infection in jowar.*—The relation of soil moisture to infection will be studied under controlled conditions. The relation of soil temperature will also be investigated.

(8) *Wheat rust.*—Co-operative studies with Dr. K. C. Mehta, Professor of Botany, Agra College, Agra, will be continued.

(9) *Bacteriophage.*—The potency of the race of bacteriophage will be " built up." Some of the general tests will be made.

(10) *Sclerotium rolfsii in potatoes.*—Experiments will be conducted on the control of *Sclerotium rolfsii* in potatoes by the application of Granosan around the bases of plants in the field.

APPENDIX M.

SUMMARY OF WORK DONE UNDER THE SOIL PHYSICIST TO THE GOVERNMENT OF BOMBAY, MANJRI FARM, FOR THE YEAR 1931–32.

The undersigned resumed charge of the post of the Soil Physicist on 1st August 1931, on his return from leave of eight months—spent in visiting the important Dry Farming areas in the United States of America. Mr. V. G. Patwardhan, M.Ag., M.Sc., who was officiating reverted to the post of the Assistant Professor of Chemistry.

The problem of Dry Farming continued to be investigated at the Dry Farm Experimental Station, Manjri, with the limited staff and reduced resources. Previous year's experiments in the field with Bajri and Jowar crop were repeated. Soil Moisture determinations were made in the laboratory from various plots. Investigations in connection with the disposal of rain water were continued both in the field and in the laboratory with the help of an additional qualified hand engaged with the funds from the Experimental grant specially sanctioned by the Director. No other laboratory work in Soil Physics could be undertaken for want of additional hands.

Season.—Raising of crops by Dry Farming method is entirely dependent on waters obtained by rains alone. Hence the total rainfall and its distribution at the station during the year plays the most important part in influencing the yields. Other Meteorological factors like the temperature, humidity and wind also influence the crop growth directly or indirectly.

The total annual rainfall during 1931 amounted to 23·54 inches and was received on 89 days. The total rainfall exceeded the annual average figure by nearly three inches. But the rains during the Kharif season, i.e. till the middle of September were very much inadequate being less than seven inches, there were only two showers of useful nature, i.e. of more than half an inch magnitude. The result in the district was that no sowing of Kharif crop became possible in many places, and where sowing was done the crop withered for want of adequate moisture. On the Dry Farm the yields of Kharif crop are much below the normal. The Rabi rains received from the middle of September to the end of December were not only nearly fifty per cent. more than the usual average for that season but were much better distributed and in fact resulted in having a wet Rabi season. This however adversely affected the crop yields on account of several insect-pests and fungoid diseases.

Experiment with Bajri and Tur Mixture during Kharif season.—The previous year's experiments were repeated in three replications to find out (1) the effect of Bunds over No-Bunds, (2) the effect of stirring the soil to depths of one inch and two inches so as to form mulch and eradicate weeds, (3) the effect of the addition of F. Y. M. at a moderate in addition to bunding and stirring. An experiment was

laid out also in triplicate plots to find out the yields obtained by cultivators' methods for comparison.

On account of the inadequacy of soil moisture the crop had to be sown late in July. The long spell of dry weather of August and half of September did not allow any tillering of Bajri plants and even the Tur plants could not make much growth. The late rains of September resulted in producing vegetative growth but no grain formation on tillers became possible. The result was that the yields of Bajri were comparatively very low.

No effect of bunds was visible. The stirring also did not show any effect.

The noteworthy points brought out in the experiments with Bajri and Tur mixture is the decisive advantage of the annual addition of F. Y. M. to a series of plots. In spite of the inadequate rains and the long break the Bajri yields of these plots were more than double those of the plots which had not received any manure. The yields of Tur crop was however not enhanced.

When compared with the cultivators' method, all the Dry Farming treatments showed an advantage varying from 20 to 25 per cent. both in Bajri and Tur yields.

The plot kept fallow in previous year gave a slightly increased yield of Bajri but the following crop of Jowar could not succeed.

Other Kharif crops.—Nilwa grown for fodder showed its drought resisting character and yielded a fair crop of fodder and small amount of grain. Other Kharif crops such as varieties of Kharif-jowar, several legumes like Mug and Matki and cotton could not stand the long dry spell and the inadequate moisture at the start.

Rabi crop of Jowar.—The experiments with the Rabi-jowar are very much elaborate and have been laid out in four replications by the method of randomization where possible. But in spite of all these precautions the inhibiting factors experienced this year have shown the inadequacy of the precautions and most of the results have been vitiated. Not less than half a dozen pests and diseases attacked the experimental plots with varying degree of intensity. Rhizactonia Bataticola, two kinds of stem-borers, Punccinia Purpuria, Aphis and a kind of sugary disease were noted to have affected the crop some time or the other during the crop-growing period.

The results are therefore to be taken with great caution and cannot be looked upon as conclusive.

On account of the wetness of the Rabi-season and better distribution of rain, the methods intended for the conservation and for efficient use of moisture could not show their superiority.

All the previous year's experiments were repeated in four replications and the results of the more important one may be summarised as follows :—

(1) The bunded series as a whole gave only four per cent. extra yield than the non-bunded but the results are not significant.

(2) The effect of different depths of stirring to form mulch is not seen in the results when compared with plots kept unstirred.

(3) In the manurial series, F. Y. M. plots have given about 10 per cent. more yield than the unmanured. Green manures could not succeed on account of bad Kharif season. The artificials also could not show any advantage.

(4) Tine tooth harrow used cross-wise has given as good a yield as ploughing. Blade harrow gave much lower yield.

(5) The cultivator's plot on account of its larger plant population when compared to the Dry Farming Method has given nearly 10 per cent. more yield.

But it may be pointed out that this year's results are entirely vitiated on account of various inhibiting factors detailed above and hence must not be looked upon as conclusive.

Other Investigation Work.—(*a*) Surface Run-off of Rain-water and Soil Erosion :—The experiment was continued during the year under report and has corroborated the findings of the previous year. Out of the total annual rainfall of 23·54 inches more than half, namely 13·72 inches was received on 8 days. The run-off took place on these days and caused a loss of rain-water from 28 to 50 per cent. of these heavy and useful rains according to the previous treatment of the land. The amount of Silt carried by water showed the enormous amount of erosion of Soil that takes place even in one season.

(*b*) The Lysimeter experiment again showed that when the soil depth is about three feet the loss of water by underground drainage is practically insignificant.

(*c*) Studies in the Evaporation of Soil Moisture from month to month are being continued.

(*d*) Water requirement of Jowar crop under field conditions is being carried under controlled and improved conditions of experiments.

District Trials of Dry Farming Methods.—With the help and co-operation of the Deputy Directors of S. C. D. and S. D., Dry Farming Methods are being tried on extensive scale in numerous places on cultivators' fields in Ahmednagar, Poona and Sholapur Districts of S. C. D. and in Bijapur District of S. D. The results of all these are very much encouraging. The experiments at Mohol however were entirely vitiated by serious attack of Rhizactonia Bataticola.

" In Ahmednagar District the ' Dry Farming Method ' was tried in 23 villages of six Talukas. The total area grown by this method was about 95 acres. Check-plots cultivated by the local method were provided for, at each of these places. The results showed that the average yield of jowar grain per acre by the method of Dry Farming was 413 lbs. as against 260 lbs. by the local method, giving an advantage of about 59 per cent. in favour of the new method. It is noteworthy that in each of the 23 trials the grain yield of the Dry Farm plot was higher than that of the local method. In addition the new method increased the yield of fodder on an average by thirty-three per cent."

In Poona District at Talegaon Dhamadhere and some adjoining villages twenty different cultivators tried the Dry Farming Method on a total area of about 126 acres and the average yield on these plots was 494 lbs. per acre as compared to 374 lbs. by the local method, thus giving an advantage of about 32 per cent. When considered from point of view of economics it was found to leave an average extra net profit of rupees five and annas twelve per acre.

The experiment at Halli in Bijapur District tried on a large scale of unit holding consisting of an area of sixty acres has shown that the method can be successfully followed in practice even on a large scale and has left some profits both in jowar and cotton in a year of very low prices.

The experiment at Bijapur proper though on a small scale has shown the great advantage of ploughing over harrowing when combined with the addition of F. Y. M.

Staff.—The increasing work in the District and the central station, has necessarily increased the work of the limited staff. Mr. G. M. Bapat, M.Ag., the graduate assistant put in very hard and conscientious work. The temporary non-graduate assistant Mr. Gadkari had also to share the responsibility of extra work. He has to work as clerk during the absence on leave of Mr. Gholap.

We are looking forward to the passing of the Dry Farming Scheme at the meeting of the Governing Body of the Imperial Council of Agricultural Research, so that more hands and greater facilities may become available for carrying on the Research work for solving the most important and the same time the most difficult problem of Dry Farming, in Famine areas.

N. V. KANITKAR,
Soil Physicist to the Government of Bombay.

Statement showing the yields of Bajri and Tur for the year 1931–32 *on Dry Farm Experimental Station, Manjri, tried in triplicate (one guntha each).*

(The results are given from the middle area after deducting a ring lot all round and calculated per acre.)

Treatment.	Bajri Grains lbs. per acre.	Bajri Fodder lbs. per acre.	Tur Grain lbs. per acre.
Cultivators' Method	214	995	230
Flat and No Mulch	252	1,184	342
Flat and 1″ Mulch	280	1,156	315
Flat and 2″ Mulch	246	881	345
Bunded Series—			
Bunds and No Mulch	314	970	292
Bunds and 1″ Mulch	252	819	327
Bunds and 2″ Mulch	239	781	320
Bunds and 2″ Mulch and addition of F. Y. M. ..	617	2,998	340

Statement showing the yields of Rabi-jowar per acre in 1931–32 *on Dry Farm Experimental Station, Manjri, tried in four replications (one guntha each).*

(Results are given from the middle area after deducting a ring plot all round and calculated per acre.)

Treatment.	Grain lbs. per acre.	Fodder lbs. per acre.
Bunded Series—		
No Mulch	793·8	1,351
1″ Mulch	774·9	1,550
2″ Mulch	774·9	1,374
3″ Mulch	812·7	1,417
Flat Series—		
No Mulch	699·3	1,342
1″ Mulch	812·7	1,332
2″ Mulch	774·9	1,389
3″ Mulch	737·1	1,422
Manurial Series—		
Bunds, 2″ Mulch and F. Y. M.	855·0	1,455
Bunds, 2″ Mulch and Ammonium Sulphate	756·0	793
Bunds, 2″ Mulch and Sodium Nitrate	869·4	793
Cultivation Series (Bunds and 2″ Mulch)—		
Ploughing with C. T. 2 Plough	993·0	1,649
Ploughing with sabul Plough	1,011·0	1,899
Tine tooth harrow	1,030·0	1,837
Blade harrow	655·0	1,762
Cultivators' method—		
Flat and seed sown with 9″ Drill at the rate of 6 lbs. per acre	915·2	1,951

Statement showing the yields of Rabi-jowar per acre on the experimental plots on cultivators' fields in the Districts during 1931-32.

Poona District.

Area cropped with Dry Farming Methods .. 126 acres 20 gunthas.
Area cropped with Local Methods .. 126 acres 20 gunthas.

Plots 20 at Talegaon Dhamadhere (in Poona District).	Average yield Grain lbs. per acre.	Average fodder lbs. per acre.
Dry Farming Method	494	1,851
Cultivators' Methods	374	1,745

Ahmednagar District. .. 23 centres.
Area cropped with Dry Farming Method .. 95 acres 24 gunthas.
Area cropped with Local Method .. 50 acres.

Plots at 23 centres in Ahmednagar District.	Average yield Grain lbs. per acre.	Average fodder lbs. per acre.
Dry Farming Method	413	1,107
Cultivators' Method	260	835

Statement showing the yields of Rabi-jowar and cotton per acre at Halli in Bijapur District, on unit Holding Scale.

Treatment.	Area acres.	Jowar Grain per acre.	Jowar Fodder per acre.	Linseed lbs. per acre.	Safflower lbs. per acre.	Net Profit per acre.
						Rs. a. p.
Jowar under Experiment (wide sowing and Inter-culturing) ..	30	273	278	91	*Nil* ..	4 11 0
Check	29	229	310	14	68	3 13 0

Cotton.

Treatment.	Area acre.	Seed cotton lbs. per acre.	Net Profit per acre.
			Rs. a. p.
Cotton under Experiment (Tine-tooth cultivation) :	30	183	6 12 0
Check	29	135	4 3 0

Programme of work of the Soil Physicist, during the year 1932-33.

(1) *Experiments with Kharif crops.*—Previous year's experiments with Bajri and Tur mixture will be repeated in triplicate plots to determine the effect of Bunding and mulching under the year's rainfall. Some varieties of Kharif-jowar would be tried on a small scale, with Cotton and Nilwa.

(2) *Experiments with Rabi-jowar.*—Last year's experiments will be repeated in 4 replications where possible to determine (1) the effect of different preliminary cultivation, (2) the effect of bunding, (3) the effect of mulches of different thickness, (4) the effect of different densities of plant population, (5) the effect of addition of green manures, (6) the effect of keeping the land fallow, etc.

(3) *Other Investigation Work.*—(*a*) Experiments of surface Run-off and Erosion will be continued, (*b*) water requirement of Jowar crop on plot scale will be determined, (*c*) the study of the evaporation of moisture from soil will be continued, (*d*) experiments with Lysimeters to determine the loss of water by drainage will be carried out.

(4) *District Trials on Field Scale.*—Dry Farming Methods will be tried on holding scale in the Southern Division with the help of the Deputy Director near Bijapur on cultivator's field. Other field scale trials on cultivators' fields in Poona and Ahmednagar Districts would be tried as far as possible with the co-operation of the Deputy Director, S. C. D.

N. V. KANITKAR,

Soil Physicist to the Government of Bombay.

APPENDIX N.

Summary of Work done under the Live Stock Expert to Government for the year 1931-32.

Personnel.—Mr. Edw. J. Bruen held charge of the Livestock Section for the year. During the year two additional men were appointed to the Section :—

(1) Mr. A. K. B. Cazi, B.Ag., B.Sc. (Edin)., N.D.D., D.I.C., F.R.H.S. (London), who has been entrusted with the Nutrition side of the Section.

(2) Mr. S. S. Khot, B.Ag., who has been appointed Divisional Inspector of Cattle Breeding, S. C. D., Pandharpur.

The Section thus has four Divisional Inspectors as against three the year previous.

The Livestock Section has undertaken the following :—

(*i*) Advisory work.

(*ii*) Propaganda and teaching in villages.

(*iii*) Breeding pure strains of cattle on the several Government Cattle Breeding Farms.

(*iv*) The placing out of Breeding Bulls on the Premium System from those bred on Farms and bulls purchased.

(*v*) Holding of Shows and Demonstrations.

(*vi*) Improving the milch buffalo.

(*vii*) Propaganda in the storage of fodder as hay and silage.

(*viii*) The conducting of Nutrition Experiments to ascertain value of concentrate foods and roughage fodders.

(*ix*) The improvement and breeding of certain foreign breeds of fowls.

(*x*) Feeding Experiments with foodstuffs for poultry.

(*xi*) The improvement of village poultry by placing out pure bred cocks in villages.

(*xii*) The supplying of poultry to private breeders and on concession rates to cultivators.

(*xiii*) Advice on the feeding of poultry and their care.

Advisory Work.—This comprises of inspection of sites, drawing of plans and estimates for dairy, cattle, sheep and goat farms. Private farms are visited and advice given. Advice both in person and in writing has been given to neighbouring small States. During the year advice on Nutrition, the feeding of cattle and poultry was given by Mr. Cazi, Nutrition Assistant.

Propaganda.—Propaganda on the keeping, breeding and rearing of better cattle and poultry was carried out in over 200 villages during

the year. The advantage of better marketing of dairy, sheep and poultry products was explained in detail and it is hoped that this propaganda will soon bear fruit. Demonstrations were conducted with a mechanical shearing machine at 6 centres in the Southern Division. The Dhangar or professional sheep breeder taking a very keen interest, being poor people, they cannot invest in the machine, but it is hoped that a co-operative method of shearing may be introduced.

The Live Stock Expert was out in the district on tour for 180 days in the year.

Demonstrations.—The use of silage, how it is made and utilised was demonstrated in villages as given below :—

Northern Division	..	Sahij, Dabhla and Nedhrad in Ahmedabad District and Vaghaldhara and Abrama in Surat District.
Central Division	..	Bhatpura and Fattepur (both in West Khandesh District).
Southern Division	..	Chalgeri, Sidenur, Kordur, Kanchargatti and Konantambgi (all in Dharwar District).

This year, a number of the cutcha Silo pits have been made pucca permanent. Pucca Silo pits are now to be seen in the following places :—

Nedhrad (District Ahmedabad).

Fattepur and Bhatpura (District West Khandesh).

Kordur, Sidenur and Mudenur (District Dharwar).

The Silage made was excellent and the people have taken to the making of Silage.

Shows and Rallies.—During the year Shows and Rallies were held as given below :—

Cattle Shows—

Devargudda, District Dharwar ..
Mahud Budruk, District Sholapur ..
Yedur and Nandi, District Belgaum.
} These Shows were helped in organisation and finance by the Department.

Cattle Rallies—

Chharodi, District Ahmedabad ..
Govinda, District Ahmedabad ..
Sanand and Dholka, District Ahmedabad.
} These Rallies were organised and held by the Department.

The breeder is fast realising the benefits of the Show Ring and they are now more or less recognised as places for competition and not purely gatherings, where a few rupees are distributed. Competition is keen

and cattle are brought in proper Show condition. Breeders take an interest and for further guidance want to know the reason why prize winners have succeeded.

The Rallies held in Ahmedabad District were a great object lesson to the breeders, who were able to compare their cattle with other breeders' cattle.

The popularity of Shows is demonstrated in the fact that Government financial help is gradually being reduced, and the public are making up the deficiencies themselves.

This Section did not organise a Poultry Show this year, as it was thought, it was high time the people learnt to do this for themselves with a result that no Show was held. The public still must and will rely on Government officials doing this work for them.

Breeding Operations in the District.—The effect of the world trade depression has had its effect on the cattle industry during the year. Owing to the purchasing power of the cultivator being hit very badly, the prices of all forms of livestock depreciated at least 33 per cent. during the year, very little buying and selling of cattle taking place at fairs.

A grant of Rs. 4,500 was made by the Sir Sassoon David Trust Fund to advance loans at 2 per cent. interest to breeders to purchase bulls. Advantage of this loan was quickly taken by the breeders resulting in the whole Fund being loaned out within a couple of months.

Premium bulls.—The use of a known pedigree bull is slowly but surely taking hold on the country. The old theory of maternal impress still exists, and to wean breeders from this erroneous belief has been a difficult matter. Another obstacle to quick economical improvement has arisen and that the early selling of bulls to avoid loss in sale later on. The fallacy of this impression was carefully demonstrated to breeders and it is hoped that this defect will be cut short.

Disease is still a great hindrance in breeding. If it could be made possible to immunise each village as it is taken up for cattle improvement, it would help.

Another very important point is the control of disease. Breeders in certain parts of the Presidency dispose of their stock at recognised fairs or jathras. These jathras are attended by dealers of cattle from even outside Bombay Presidency limits, and having travelled miles and come in contact with many villages they invariably bring and then spread disease. The jathras and fairs in neighbouring States were the root cause of a very virulent outbreak of Rinderpest in Sholapur District. Some form of control at these jathras is essential. Prevention would, I feel, be considerably cheaper than the cure.

Work has progressed fairly well in the Ahmedabad and Surat "A" zones. Really good progress has been made in the South Central Division "A" breeding zones. The progress in the Southern Division "A" zones has been very poor.

The following statement gives a clear idea of the progress made :—

Zone.	Number of bulls working on 1st July 1931.	Number of bulls whose period expired during the year.	Number of bulls put out during the year.	Number of bulls on hand on 1st July 1932.
Intensive Breeding Zones—				
Chharodi	30	8	9	31
Surat	9	2	2	9
Satpura	6	2	7	11
Sholapur	11	1	18	28
Belgaum	3	1	..	2
Bankapur	19	5	6	20
The rest of the Presidency—				
Southern Central Division	..	..	1	1
Northern Central Division	2	..	10	12
Southern Division	2	..	1	3
Gujarat	8	..	10	18
Konkan	2	2	2	2
	92	21	66	137

A very encouraging feature in this year's development has been the possibility of procuring bull's progeny of previous Premium bull. We are now able to use purchase-bull of known pedigree, which is a great step forward in our work.

The market value of progeny of Premium bulls is as much as 30 per cent. greater than ordinary well bred stock.

It is difficult to estimate the value of work from Premium bulls although efforts have been made from time to time.

It will be interesting to note the following results from 3 villages in the Khillar "A" breeding zones. Calves from Premium bulls realized the following :—

Name of village.	Taluka.	District.	Amount realized, R. A. P.
			Rs.
Korti	Pandharpur ..	Sholapur ..	600
Gondowli	Peta Man ..	Satara ..	1,200
Mahud Budruk	Sangola ..	Sholapur ..	1,000

This gives a fair idea of the usefulness of the Premium System.

Registration of Cattle.—This year we have been able to introduce the registration of pure bred cattle in all the breeds. The method employed is to tattoo a number in one ear and the abbreviated name of the village in the other. All animals so tattooed are entered in a Register showing dam's and sire's numbers; in this way we hope to tattoo all the good cattle in the Presidency. Another feature of this tattooing is that it will be of considerable help in tracing cattle in cases of cattle lifting or theft.

Palghar Dairy.—The Palghar Infants and Public Milk Supply Company (Ltd.) is gradually improving its position for the fourth year in such this farm has paid a dividend. The Company is now devoting more funds to very necessary improvements, such as stables, water-supply and fencing.

Sheep Breeding.—No progress has been made in sheep breeding. A Scheme to establish a Sheep Breeding Experimental Farm was submitted for the support of the Imperial Research Council, Simla.

Poultry.—Great strides have been made for the improvement of poultry in the district. We have now concentrated in Satara and Palghar talukas of Thana District, over 100 cocks having been placed out in these areas. It is hoped to take up work next year in Sholapur District. Statement (Appendix XV) shows a comparision of the number of cocks placed out in 1930-31 and 1931-32, also giving the areas in which they have been placed.

General.—All the staff under my control have worked well. The only area which has not shown a distinct advance is the Southern Division. Mr. M. M. Desai, Manager, Chharodi Farm, has done very good work during the year. His office is well managed and has been very favourably commented on by auditors. Mr. G. V. Hardikar, Divisional Inspector, has put in good work during the year.

Mr. V. V. Dongre, Head Clerk, has managed my Office very well and all the clerks have given of their best during the year. My touring clerk Mr. Y. K. Phadke has worked, as is usual, willingly under very trying conditions in the district.

NORTHCOTE CATTLE FARM, CHHARODI.

Personnel.—Mr. M. M. Desai, B.Ag., held charge of the farm for the whole year; for a time he worked single handed as his Assistant Manager was deputed for other work. The Manager is very ably assisted by his clerk Mr. N. D. Naik. The office records are kept well and up-to-date.

Season.—The season as a whole, though high temperatures were recorded at times which troubled the staff and cattle, was favourable. The temperatures in April, May and June at times exceeded 120° Fah. The monsoon was again late, the first showers coming in the first week of July, which enabled the starting of sowing operations.

Owing to the vagaries of the monsoon, sowing took from the 5th July and until the end of the month. As most of the rainfall at Chharodi occurs in July and August, the flies get very bad and are a great source of trouble affecting the health of the cattle, which usually results in an epidemic of Dengue fever.

Large precipitations of rain in August water lodged the whole area and the crops were standing in from 9 inch to a foot in water for weeks. These conditions subsided after the first week in September.

In October for two days cyclonic weather with heavy rain caused some little damage to crops, this being unusual; the remainder of the year was normal.

Appendix (I) gives the cost of material and the different stages of manufacture of silage.

CROPS.

Jowar.—Owing to the land at Chharodi being low-lying it is easily water lodged, consequently after many years of experiment with different fodders and different varieties of Jowar, it has been found that the local variety of Jowar withstands such condition best; consequently as a Kharif crop, this variety of Jowar was sown in 54 acres and 7½ gunthas out of a total area of 65 acres and 39 gunthas. Very good Ratoon crop was obtained from the whole area.

Yield of Jowar :—

1,53,327 lbs. Kadbi,
13,830 ,, Grains,
3,45,228 ,, Green Fodder,
81,491 ,, Green Ratoon Fodder.

Cultivation.—On the whole the season was favourable to cultivation, the slight loss in grain and fodder lodging was amply made up for by the Ratoon crop, for which favourable conditions existed.

Cold weather crops although good would have done better, had it not been for the poor dew during the cold season, which was totally absent this season. If finances would permit to provide more irrigation, the results from cultivation would be the means of saving a good deal on the feed of cattle.

Silage-making.—During the year 3 pucca and 4 kacha pits of silage were made from Maize, Jowar and green fodder, amounting to 4,60,000 lbs. at a total cost of Rs. 1,121-9-5 or Rs. 2-7-0 per 1,000 lbs.

Maize.—Owing to the low-lying land, it is necessary to sow Maize at the first opportunity; this was the first crop sown and consequently suffered by the short drought in the latter part of July.

Eight acres and 37 gunthas were put down to Maize, and the yield obtained of green fodder was 1,17,402 lbs., this was Kharif Maize. As a hot weather crop 28 gunthas were put down to Maize and Chavli, this area yielded 14,700 lbs. of green fodder.

Bajri.—Bajri was sown on 2 acres and 32 gunthas, following a Maize crop. This was not very successful, the yield being 2,395 lbs. of seed and 10,990 lbs. of Bajri kadbi.

Gram.—During the year under report gram was tried as a dry rabi crop. The cold weather not being favourable, the crop was not a great success. The first crop sown was spoilt by rain and the two later sowings

however had more favourable conditions. The yield of 1,820 lbs. of grain and 2,338 lbs. of fodder suggests that it will be a useful rotation crop, especially as farm-yard manure is likely to go short as our cultivation extends.

Berseem.—After 3 years' experience it is now conclusively proved that Berseem is a useful fodder crop in this area; although as above mentioned, the winter was not favourable, a yield of 19,980 lbs. was obtained from 21 gunthas. This crop had to be protected by a crop of Oats and Peas as rabbits, porcupine, etc. being fond of the crop would otherwise have spoilt it.

Oats and Peas.—This also promises here as an irrigated rabi crop. A small plot sown yielded in two cuts at the rate of 36,673 lbs. per acre. This will be tried on a larger scale.

Elephant grass.—This has again proved itself well, a small plot yielding 14,753 lbs. It is intended to extend this next year.

Crops (General).—Appendix (II) gives the total cost of growing the different fodder crops, the economic value of which is easily worked out. As far as we are concerned, it is the unit feed value of fodder at the right time that we are interested in.

Hay-making.—This year's hay crop was good, the farm only making 2,93,125 lbs. of hay for the Sir Sassoon David Trust Fund at a cost of Rs. 888-14-3 and 3,05,302 lbs. for farm use, which worked out to Rs. 1-12-6 per 1,000 lbs. for cutting, carting and stacking loose in Dutch barns. The remainder of the farm grass lands were leased out to a Contractor for cutting and carting away hay for Rs. 2,800.

Breeding Herd.—Strength of the herd during the year stood as under:—

Stud bulls	4
Cows	69
Heifers	41
Young bulls	67
Bull-calves	36
Cow-calves	24
Bullocks	40
Buffalo-bullock	1
	282

The improvement of the herd at Chharodi still continues. The actual details in improvement and methods employed are described at length in the Experimental Records. Due to judicious selection, casting and breeding, the farm has gradually evolved a herd of cows which now more or less are milked. This achievement in a few years is, I believe, very good. To-day only a very few non-milkers are to be seen at Chharodi that are not milked and these are especially maintained for certain qualities.

To enable better results being obtained in breeding, a new system of selection of bulls has been introduced. Young bulls are used as early as possible and are kept under observation until sufficient sisters of the bull have shown qualities of this line, and further to watch daughters of these bulls. In this way we shall make our breeding results more sure and certain.

During the year only 12 heifers calved for the first time, of these 2 have yielded over 5,000 lbs. of milk in their first lactation and 2 others over 2,000 lbs. Rinderpest the year previous was the cause of others failing.

The effect of Rinderpest is summed up in the following statement :—

Sex.	Born Normal.	Premature birth.	Born weak.	Died of premature birth.	Died of weakness.	Still-born.	Sold being no class.	Remarks.
Male ..	25	4	..	4	..	3	..	
Female ..	26	..	2	..	2	..	4	

Births.—During the year 82 per cent. of the breeding females dropped calves, a great improvement in regularity of calving. A calf born from a first calving cow weighed 75 lbs. at birth, showing that early maturity has no ill-effect on the progeny.

Disease and Deaths.—The year was partially bad from the point of disease. The effects of Rinderpest from the year previous claimed many abortions and premature births. A mild form of Foot and Mouth disease occurred in June. The herd was inoculated against Hæmorrhagic Septicæmia. Dengue fever appeared in July, which affected many animals. Then in October, we had a second attack of Foot and Mouth, this second being more noticeable in the feet of animals. With all this there were only 15 casualties as against 35 in the year previous.

Sales.—The total number of animals disposed off during the year was :—

Sold	71	
Exchange premium bull	1	(Free).
Sent to Pinjrapole	1	
	73	

for a total sum of Rs. 2,910.

Barring the two animals disposed of free, the 71 heads sold fetched an average of Rs. 40-15-9 per head as against Rs. 48-5-7 per head for 78 animals sold last year.

Among the animals disposed of, 16 were bulls issued on Premium System, 7 were bulls for breeding purposes sold to Radhanpur and Baroda States, 5 were bullocks and the rest female and young-stock. The Radhanpur State bought our breeding bull "Todar".

Sale of bulls on Premium System.—This year as many as 16 bulls were issued on the Premium System, out of which 4 went to Kaira District, and the rest in Ahmedabad District. Thanks to the subscription in aid of indigent cattle breeders by the District Local Board, Ahmedabad. All the agents in this district received help of half the amount of the purchase price.

Of the 4 bulls in Kaira District, 3 bulls went to the Dakore Temple Committee, one of which was our ex-breeding bull.

Receipt of cattle.—During the year under report an extraordinary feature occurred in the receipt of 21 heads of bulls received by transfer from Surat Dairy Farm to be maintained here and issued subsequently as Premium bulls. One of this has died, but the rest have not taken on good condition. Also 8 "B" class young bull-calves were received at the farm during this year. This brings the total of 15 "B" class bulls purchased up-to-date.

Appendix (III) gives a detailed list of bulls placed out in the district.

Breeding Progress.—In Appendix (IV) will be found comparison of maturity of daughters with dams and traceable to the influence of the sire.

At Chharodi we have been able to maintain size, type and have introduced milk, early maturity and regularity of calving. This has been no small problem and it has only been possible with constant contact and familiarity with the herd by the management.

Milk yield.—Although we have had rather a bad year from the disease point of view and the effect of disease, there has been a distinct increase of total milk produced. The herd yielded 1,31,648 lbs. of milk as against 1,17,327¾ lbs. the year previous and this year only 64 cows were in milk as against 66 the year previous.

Appendix (V) gives the milk yield month by month for the years 1930-31 and 1931-32.

It will be seen how steady the yield is throughout the year with the exception of the months of July, August and September when good green grazing is available.

Progress of the Milking Herd.—A statement (Appendix VI) showing progress in the yielding capacity of the Kankrej cows at Chharodi is attached. The statement speaks for itself, but it cannot go without mention that although the percentages are comparatively less, the annual average yield per cow is on the increase. This is due to the fact that we are now having cows in milk, many of which are higher yielders than their predecessors, which although they counted among milch stock were actually very poor.

Fat contents of milk.—In our breeding work we have not lost sight of the value of the fat percentage of milk in an economical animal. Fortnightly tests are taken of all cows, and it is hoped to give some very interesting data on this problem in the near future.

The attached Graphs (3) show progress of the milking capacity of the herd.

Services to the Public.—

(1) Through the Farm Agency a silo pit was dug and filled with green grass by Mr. Malekji Patel of Viramgam.

(2) A cattle rally was held at the farm and Premium bull agents had a fine time in the advice that was given to them and to see and judge the standard of the farm cattle.

(3) The Ahmedabad Pinjrapole people took advantage of the services of the farm staff to emulate advanced methods in farm management. An important feature of the advice was the introduction of Berseem.

(4) A student from Khandesh was taken up for practical training and is under instructions at the farm staff at the time of this report.

(5) A pair of bullocks is always given on loan to the Cotton Breeder, North Gujerat, Viramgam, for cultivation of his plots. During the slack season the bullocks are returned to the farm.

(6) A student writing his thesis on economics was helped by the farm for collation of figures on maintenance and economics of cattle.

Visitors.—There were 110 visitors at the farm during the year in addition to the annual inspection visit of the Director of Agriculture with the Deputy Director of Agriculture, N. D., Gujerat. A representative of the Baroda State took advantage of the farm in the way of advice regarding purchase of bulls. The Agricultural Chemist to Government, the Cotton Breeder, North Gujerat, Viramgam, and a member of the staff of the Economic Botanist also visited the farm.

Miscellaneous.—Among the permanent structures made during the year were a calf-shed by the Public Works Department and a new cattle trevis by the farm.

The pipe-fencing of yards proceeded somewhat this year also.

A separator was transferred from Bankapur Farm to this Farm.

Planting of Neem trees along the main road also continued.

The cropping area was divided and put down into fixed plots during the year.

Cattle Breeding Farm, Bankapur.

Personnel.—Mr. A. B. Gadagkar, G.B.V.C., held charge of the farm throughout the year.

Season.—The monsoon season was late this year not making an appearance until the middle of June. Anti-monsoon showers were also absent, consequently no preparatory agricultural operations were possible but for very heavy showers of rain in September, which

prevented interculturing, the season on whole was good and the rain timely. It was a good monsoon from the point of view of hay-making, as the grass grew very well. The heavy rain in September helped considerably with this year's Ratoon crop, its yield being almost as good as the original main crop.

Grass lands.—As previously stated the grass crop was good. The grazing area is now gradually being curtailed due to the extension of fodder crops. By cutting green grass and feeding it in stalls and judicious rotational grazing the area sufficed for 4 months' grazing and yielding 3,34,000 lbs. of green grass as against 2,47,296 lbs. in the year previous.

Kalasgeri grass lands.—Here again the grass growth was good and the farm was able to graze 105 cattle for two months. Over and above this grazing 44,200 lbs. of hay was harvested. In this area hay harvest clashes with the rice harvest. For economy sake the hay was not harvested till late in December and was not completed until the end of February. This year the farm was able to show a considerable saving in hay harvesting charges. This saving is due to the more efficient management of mowing machines.

Experimental new varieties of grass.—Two varieties of supposed drought resistant grasses were imported from Brazil. Gordura and Jaragway seed was first imported and sown to a small plot. During the year stolons from this were transplanted to a bigger area. The grasses have proved to be fair so far, but nothing definite can be said until the end of the next year.

Live-stock.—The following table shows the strength of the herd during the year :—

Stud bulls	3
Cows	32
Heifers	38
Young bulls	12
Bull-calves	13
Cow-calves	14
Bullocks	12
	124

During the year 20 bull-calves and 19 cow-calves were born as against 31 the year previous. A very noticeable improvement at Bankapur is the weight of calves at birth, the average weight being 43 lbs. This year's calves are far superior to any yet born on the farm and the result is due to using a farm bred bull of known pedigree. There is now uniformity in the herd of calves.

The young female herd is now very uniform in every respect. We have been able to fix a type, which is precisely true in the female line. The male stock although a great improvement on the previous year is still a little out of type although the males are a fine looking lot.

Colour and length of sheath.—The above two defects, I am pleased to report, have been overcome. We are now producing uniform calves and the pendulous sheath so noticeable a year or two back has now been completely bred out of the herd. The selection in breeding and the separate housing of young bulls in loose boxes has helped considerably in this reduction of sheath.

Early maturity.—We are gradually but surely breeding early maturity into this herd. The following three typical cases of early maturity will bear out the above statement :—

Brand No.	Date of birth.	Date covered.	Age.
186	11th June 1928 ..	25th May 1931 ..	2 11
187	15th July 1928 ..	15th August 1931 ..	3 1
190	13th September 1928 ..	7th March 1932 ..	3 8

Regularity in breeding.—By selection and breeding we are gradually getting more and more regular calvers. The average period between two calvings is now 14 months, the longest period of a few being only 18 months. This I feel is a great advance.

Premium bulls and Sale of animals.—Owing to the depression prices of stock have gone down considerably in this area, and owing to the bad colouration of bull-calves which were castrated early, only three bulls were available during the year to be put out as Premium bulls. It is anticipated from now on that every bull-calf born will be a good breeding bull and we shall not have to resort to any further castration.

This is no small achievement in 10 years to breed up a most heterogeneous herd into a herd that will throw true to type.

During the year under report to economise on feeding it was decided to auction young bulls as soon after weaning as possible, under conditions that such bull-calves would be reared up by the purchaser for breeding purposes.

The first sale was held on the 5th May. Being a new departure, this sale was not very well attended and yet fair prices were realized. From a financial point of view the sale was a success. Eighteen bull-calves were offered for sale, ranging from 9 months to 2½ years of age. The total value realized was Rs. 1,010 or an average of Rs. 56 per animal. In the past after keeping bulls for 3½ years only Rs. 100 to 150 was the usual price realized, so it will be seen that the farm taking everything into consideration realized better prices. From enquiries after the sale it is felt that at each successive auction better prices will be the rule.

Disease and Inoculation.—During the year one case of Black Quarter occurred on the farm; the whole herd was consequently protected by inoculation; 98 animals were inoculated by the Serum Simultaneous

Method against Rinderpest. Similarly 140 vaccinations were done against Hæmorrhagic Septicæmia during the year.

Petty Construction and Repairs.—During the year under report the following works were carried out :—

(1) Corrugated sheet roofs were erected on 5 Silo pits ;

(2) A plot measuring about 2½ acres was levelled by filling in a moat and this plot was divided into paddocks and fenced.

Farm Machinery.—A new Petter Crude Oil Engine was purchased and installed on the farm. This has been a great saving in expenditure ; this pumping outfit now pumps 650 gallons of water in an hour at a cost of 2½ annas per hour. This is the only source of water on the farm. When finances improve, opportunity must be taken to put up a second pumping plant ; firstly as a stand-by and secondly to raise some green fodder in the hot weather.

Silage:—During the year 610,374 lbs. of silage was made as against 371,819 lbs. the year previous. The following table gives the kind and quantity of each material used :—

	1931-32.	1930-31.
	Lbs.	Lbs.
Maize	150,208	72,376
Bajri	460,166	98,792
Jowar	....	172,063
Grass	....	28,588
	610,374	371,819

Maize again proved to be the best material for silage, although cattle eat with relish other types of silage.

Bajri does not make a good silage if not cut very early ; if the seed is allowed to form the stems become hard and there is a big wastage when feeding.

Fodder Crops.—During the year 28 acres and 26 gunthas of land were brought under cultivation. A plot measuring 1½ acres is new reclaimed land but a similar sized piece of cultivated land was not sown as considerable damage used to be done to the crops on the plot by monkeys.

The following crops were grown on the farm :—

Maize,	Bajri, and
Jowar,	Kulthi.

In addition the following fodder grasses were grown :—

Lucerne,	Gordura, and
Guinea grass,	Jaraguay.

(1) *Maize.*—An area of 8 acres and 15 gunthas was sown to Maize at the rate of 40 lbs. per acre. The yield obtained was 150,208 lbs. of

green fodder cut for silage with one small plot left to seed, which yielded 2,538 lbs. of seed, 550 lbs. of which was retained as seed for the next year and the remainder fed to calves. The outturn was very good this year as compared to other years.

(2) *Jowar—(Nandyal variety).*—Jowar was sown to 8 acres and 2 gunthas at the rate of 40 lbs. per acre. The whole crop was allowed to seed. Thus 76,825 lbs. of dry kadbi for fodder and 2,103 lbs. of grain was obtained. A small area was cut as green fodder amounting to 4,000 lbs. Owing to the late rains in September a good Ratoon crop, which yielded 13,000 lbs. of green fodder, was obtained.

The Nandyal variety does not produce good dry fodder, so henceforth the local variety will be tried.

Jowar was tried as a second crop following Bajri on about 6 acres and 20 gunthas but for want of rain this failed and 8,600 lbs. being obtained.

(3) *Bajri.*—Bajri was sown to 10 acres and 14 gunthas at the rate of 40 lbs. per acre. A yield of 460,166 lbs. of green fodder was cut and silaged and 72,000 lbs. cut and fed green.

(4) *Lucerne.*—A small plot of 5 gunthas of Lucerne has been planted near the pump to make use of the engine cooling water which is otherwise wasted. This area yielded in six cuttings 4,727 lbs. of green fodder.

(5) *Guinea grass.*—The crop is being grown as a dry crop in the bed of a tank. The area sown is 30 gunthas and 4 cuttings yielding 10,115 lbs.

(6) *Kulthi.*—Kulthi was sown as a second crop on plots Nos. 3, 4 and 8, which were harvested early, totalling in all 10 acres. From this area 13,700 lbs. of green fodder, 7,000 lbs. of seed and 22,530 lbs. of chaff was harvested. Kulthi not only supplies us with a good nutritious dry fodder but forms a good rotation.

General—There has been great improvement on the farm not only in the live-stock but also in land development. Mr. Gadagkar has worked well during the year.

Appendix (VII) shows Crops grown and Yields obtained.

Central Poultry Farm, Kirkee.

Personnel.—Mr. S. R. Zaidi held charge of the farm during the year but for a short period whilst on leave Mr. B. B. Jamaspjina, B.Ag., was in charge.

General.—The farm had in every respect a better year than the year previous. The financial results were better and a fair amount of extension work was carried out at small expense.

During the year 12 testing pens were erected. These pens consist of a small concrete house with a small independent run attached to each. In each pen are placed two fowls, one laying a white egg and the other a tinted egg; so it is an easy matter to test out each bird. In

the following year all those birds laying more eggs than the average will be bred from; in this way it is hoped to gradually increase the number and size of egg laid.

During the year 6 pens completed 7 months and 12 pens 6 months of the test of 12 months. In Appendix (VIII) attached is given in detail the number of eggs laid by each bird for each of the months covered so far.

This is the only reliable method for testing birds and for improvement in breeding. This is possibly the only test of its kind carried out on any Government farm in the East. The farm is now breeding the White Leghorn, the Australorp, the White Wyandotte and the Rhode Island Red. From results it can safely be said that all these breeds thrive well in the Bombay Presidency.

Incubation.—This year's hatching results although not as good as it might be are a great improvement on the year previous. From the Statement (Appendix IX) attached, there are a number of useful points to be gleaned:—

(*i*) The fertility of eggs is not good until the middle of December. This is possibly due to the hens and cocks having only recovered from moult a short while before being mated.

(*ii*) The results of incubation improve gradually from November up to February and beginning of March.

(*iii*) That the larger the incubator the better the results; 50 egg incubators evidently not being suitable owing to the difficulty of controlling moisture.

(*iv*) It is not safe to store eggs for incubation longer than 10 days unless some extra precautions are taken to prevent evaporation of moisture from eggs.

Sale of hatching eggs, chickens and fowls.—During the year 478 or 39·10 dozen settings of eggs were sold together with 206 birds. The Statement (Appendix X) attached shows how these were distributed over the country. Statement (Appendix XI) shows month by month the progress of egg yield of the flock and disposal of same.

Yield of flock birds.—Statement (Appendix XII) shows how the different breeds and strains within breeds have performed month by month and the average for the year.

If one carefully studies this statement, it clearly shows how necessary it is to have different breeds of fowls on a commercial farm to keep up the average monthly egg yield. It will be seen that the Wyandottes and Rhode Island Reds do best from November to March, Australorp from April to September and White Leghorn from November to April. The White Leghorn has again proved to be the best layer.

Statement (Appendix XIII) shows the disposal of eggs and used for hatching on the farm, sold for hatching and sold as table eggs with amounts realized.

Statement (Appendix XIV) shows the strength of flock during the year.

Conclusions.—One very noticeable feature ascertained during the year is that there is a plentiful supply of eggs on the market from January to March, and consequently eggs are cheap. From March onwards eggs get scarce and the price is good. Breeders need to take note of this and so arrange that their birds come into lay from March onwards to meet the demand, which is very profitable.

Staff.—Mr. Zaidi has worked exceedingly well during the year. He has been responsible for improving the financial returns to the extent of over 50 per cent. during the year.

Financial position.—The total budget of the farm for the year was Rs. 3,060, of this amount Rs. 1,619-8-5 was spent on petty constructions and repairs to staff quarters, meaning that the recurring expenditure was Rs. 1,440-7-7; the total realization being Rs. 1,559-6-9. Apart from this the valuation of the flock has increased considerably by addition from farm breeding; thus it will be seen that the receipts of the farm exceed the expenditure by roughly Rs. 120. This expenditure includes everything excepting the pay of the Manager. It is anticipated that next year this will be improved on. Mr. Zaidi is to be congratulated.

Visitors.—This farm being located on the main Bombay-Poona road a number of people visit the farm for seeking advice, purchase of birds, eggs, etc. The following were among the distinguished visitors:—

The Honourable Minister of Agriculture,

The Honourable Sir and Lady Rustom J. Vakil.

Bombay Gowrakshak Mandali, Kandivlee.

Kandivlee Gowshala.

(*i*) Government are keeping up their subsidy to this farm.

(*ii*) The farm now consists of 50 cows, 66 female young-stock, 3 breeding bulls and 31 bull-calves.

(*iii*) The cattle bred at the farm are getting more acclimatised as is noticed by a substantial reduction in the death rate year by year.

(*iv*) This Mandali have made very great progress with its subsidiary farm at Betagaon, where it is intended to raise all young-stock and keep dry cows, thus relieving the congestion at Kandivlee. The Mandali have erected cattle sheds, grass and grain godowns, servants' quarters and a hospital at a total cost of Rs. 19,000. A sum of Rs. 2,000 has been spent on clearing and levelling land and Rs. 2,000 on fencing the whole area.

The Mandali have erected a very fine water-supply for drinking water for cattle as well as for irrigation at a cost of Rs. 11,600. The buildings are all on improved sanitary plans. It is anticipated that a further sum of Rs. 13,500 is being spent for more cattle byres and improving the sanitation of the first buildings erected.

The Mandali have purchased a tractor with implements for Rs. 2,300, and it is hoped that very shortly some 80 acres will be brought under various crops under irrigation.

(*v*) The Mandali with its sister institute at Mulund have purchased more Gir cows during the year.

General.—It will be seen that the Gowshala has made real progress and is now no more a mere shelter for useless cattle but a useful institute doing both useful constructive work and yet not forgetti g its duty to disabled cattle.

The Joint Honorary Secretaries Rao Saheb Harjivan Valji and Mr. Vrajlal Narsilal Shah are to be congratulated. Mr. Nanalal T. Tarkas, the paid Secretary, has co-operated with this section well with the results mentioned above.

Animal Nutrition.—The bulk of the animal nutrition work has been conducted at the Northcote Cattle Farm, Chharodi. The work is now extended to various other centres.

Northcote Cattle Farm, Chharodi.

The following nutritional problems are being tackled :—

(1) Determination of the relative nutritive values of cattle food-stuffs especially those roughages that form the basal portion of the usual rations.

It is pleasing to know that the nutritive value of the grass hay at this farm is as good as the average type of European hays, its starch equivalent being about 38 lbs. per 100 lbs.

(2) Experiment on commercial mineral licks is being continued to determine its effect on the rate of growth of animals, improvement of appetite, early maturity, milk secretion, regularity in calving, resistance to diseases and various physiological activities.

It should be mentioned here that in our investigations of ascertaining mineral deficiencies the soil of this farm has been analysed. Analysis shows that it is fairly rich in CaO but somewhat poor in P_2O_5. As a result of the cattle here being well managed and fed, they have been receiving cakes, cereals and cereal products which are all rich in P_2O_5. Hence though the region is deficient in phosphates, this deficiency is made up by the imported food-stuffs. This explains why Chharodi bred cattle are massively developed and possess comparatively good bones.

(3) Attempts are being made to make the cattle at Chharodi more and more docile, so that it will not take long to start hand rearing of calves. The object of aiming to rear the calves artificially from the very beginning of their existence is to accustom them to narrow and minerally balanced or "Milk type" nutritive ratio and at the same time to influence them to increase their appetite, as both these methods tend to influence the animals to develop dairy characters.

(4) Improvement of pasture for hay through manuring and introducing of suitable leguminous flora has recently been taken up in hand.

(5) Soy bean which possesses now world-wide reputation among Scientists as being one of the very few vegetable products which possess proteins and among the latter phosphoprotein of high biological value and as such could replace meat, fish or milk is now introduced as a crop and will be utilised in various forms for feeding and experimenting.

Betagaon (District Thana).

(1) This place being adequately supplied with perennial water, an experiment with a view to establish and improve permanent pasture of high live-stock carrying capacity has been started. Its results will be of vital importance for irrigated regions where mixed farming is to be practised.

(2) It is proposed that as soon as surplus hand is available, experiments on feeding of calves will be taken up in hand. Such an extra hand is expected in a future post-graduate student.

Kandivlee Gowshala.

An experiment has been started to improve the monsoon grown pasture for hay so that it carries a suitable mixture of leguminous flora.

Central Poultry Farm, Kirkee.

(1) An experiment with Soya bean as one of the constituents of poultry mash is being conducted.

(2) An experiment to determine the nutritive value of germinated grains against grains not so treated in the scratch ration of poultry is being run.

(3) Soy bean is introduced as a crop.

Cattle Breeding Farm, Bankapur.

(1) Relative nutritive values of basal ration are being determined.

(2) An experiment on mineral matter is being conducted.

Work in the District.

(1) Effect of feeding proprietary mineral licks on the various physiological activities of cattle and their power to resist diseases is being observed.

(2) With the help of the Agricultural Chemist attempts are now being made to determine the mineral contents of various common grasses and fodder crops grown in the different regions of the Presidency.

(3) Attempts are made to collect the seeds of the local leguminous flora growing spontaneously during the rains with a view to test them later on as a complementary mixture in our grass lands to improve their nutritive values and calcium contents.

Work at the head-quarters (Poona).

(1) As a result of analysis of commercial mineral lick it has been ascertained that it does not contain all the important ingredients as a good mineral mixture should have. Its price in comparison to its quality is rather high. Hence attempts are being made to prepare a proper and well balanced mineral mixture both as loose mass and also in brick form that would be cheap and most suitable. Sea-weeds seem to be the good source of almost all the important mineral constituents, e.g., iodine, sulphur, potash, common salt, etc. Its ash combined with bone ash in the proportion 1 : 3 is likely to give us ideal mineral mixture of organic origin, which would be cheap and readily available. For the source of iodine particular sea-weeds are required, but even if the species containing this ingredient is not traceable, any sea-weed will be used as the source of potash, common salt, sulphur, etc. In that case some Pot. iodine will have to be incorporated.

(2) A certain marsh grass whose scientific name has not yet been identified is found to act as a tonic for animals. On analysis it has been found to contain an appreciable amount of common salt and iron as ferric salt.

E. J. BRUEN,
Live Stock Expert to Government,
Bombay Presidency, Poona.

APPENDIX

Statement of Silage Making

Serial No.	Name of the Pit	Stuff filled in	Dates of filling	Total quantity filled in
1	Pucca Silo Pit in Dutch barn ..	Maize ..	6th September 1931 to 13th September 1931.	64,841
2	Pucca Silo Pit in Dhuked area..	Maize and Jowar.	8th September 1931 to 13th September 1931.	58,590
3	Pucca Silo Pit in Neem area ..	Jowar ..	14th September 1931 to 19th September 1931.	46,298
4	Khoda-Kachha Rectangular Silo Pit.	Jowar ..	23rd September 1931 to 25th September 1931.	51,471
5	Khoda-Kachha Circular Silo Pit.	Jowar ..	25th September 1931 to 28th September 1931.	55,930
6	Ranji Kachha Silo Pit ..	Jowar ..	30th September 1931 to 4th October 1931.	88,069
7	*Kachha Silo Pit in Dhuked area.*	Jowar ..	17th September 1931 to 22nd September 1931.	94,801
	Total ..	....	....	460,000

*The value of the stuff is calculated this time on actual cost of cultivation and not on much cheaper. Maize was harvested from an area of 8 acres and 37 gunthas and Jowar

I.

for the year 1931-32.

Mowing			Carting			Pressing and filling			Carting and cleaning			Value of the stuff			Total Cost			Remarks
Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	
11	9	6	22	4	0	22	6	6	4	6	6	148	5	6*	209	0	0	Started on 6th Septe m b e r 1931.
9	13	6	18	14	6	18	13	0	5	4	6	128	1	2	180	14	8	Finished on 4th October 1931.
6	0	0	17	9	6	17	3	6	4	5	0	56	11	3	103	13	3	Total quantity filled in 460,000 lbs.
4	2	0	19	0	0	9	13	0	7	8	0	66	2	3	106	9	3	
6	2	0	19	9	0	14	8	0	6	5	0	71	5	1	117	13	1	
8	8	0	33	14	6	24	0	6	11	0	6	110	5	5	187	12	11	
17	12	0	29	5	0	34	2	0	19	1	6	117	5	9	217	10	3	
63	15	0	160	8	6	140	14	6	57	15	0	698	4	5*	1,121	9	5	

market value of the green stuff. Hence the stuff as compared to previous years appears from 19 acres and 34 gunthas.

Statement of crops at the Northcote Cattle

Plot No.	Name of the area	Crop	Area of plot	Yield per acre	
				Principal product in lbs.	Rye-product in lbs.
			A. g.		
1	Old field	Maize	0 37	14,006 green fodder.	216 chaff
		Gram	0 37	173 grains.	
		Jowar	0 35	*26,565 green fodder.	
2	Old field	Jowar	1 36	285 grains.	4,347 dry kadbi. 110 chaff.
3	Old field	Jowar	4 0	408 grains.	4,617 dry kadbi. 100 chaff.
4	Old field	Jowar	4 0	416 grains.	4,228 dry kadbi. 160 chaff.
5	Old field	Jowar	4 0	375 grains.	4,156 dry kadbi. 144 chaff.
6	Old field	Jowar	2 0	292 grains.	4,056 dry kadbi. 100 chaff.
7	Old field	Maize (kharif)	4 0	14,454 green fodder.	230 chaff.
		Gram (rabi)	4 0	200 grains.	
8	Old field	Maize (kharif)	4 0	11,657 green fodder.	289 chaff.
		Gram (rabi)	4 0	205 grains.	
9	Old field	Jowar	4 0	395 grains.	†4,63. dry kadbi. 140 chaff.
10	Old field	Jowar	4 0	501 grains.	4,443 dry kadbi. 233 chaff.
11	Old field	Jowar.	1 5½	343 grains.	‡6,591 dry kadbi. 132 chaff.
12	Old field	Bajri	2 0	855 grains.	3,925 dry kadbi. 265 chaff.

II.

Farm, Chharodi, during the year 1931-32.

Value of produce per acre	Cost of cultivation per acre	Profit or loss per acre	Date of sowing	Manurial treatment per acre	Previous Crop	Remarks
Rs. a. p.	Rs. a. p.	Rs. a. p.				
112 0 9	48 0 8	+64 0 1	5th July 1931.	11 carts	Jowar ..	* Including green fodder from ratoon crop.
7 14 3	28 5 1	−20 6 10	17th October 1931.	*Nil.*		
185 15 3	31 14 5	+154 0 10	9th July 1931.	*Nil.*		
51 0 4	31 1 8	+19 14 8	8th July 1931 and 9th July 1931.	*Nil.*	Jowar.	
57 0 2	44 12 3	+12 3 11	9th July 1931.	11 carts ..	Jowar.	
53 4 9	38 9 5	+14 11 4	8th July 1931 and 9th July 1931.	8 carts.	Jowar.	
51 8 2	28 3 1	+23 5 1	8th July 1931.	*Nil.*	Jowar.	
48 4 3	33 14 4	+14 5 11	8th July 1931.	*Nil.*	Jowar.	
115 10 2	37 15 6	+77 10 8	5th July 1931.	11 carts. ..	Chavli and Tur.	
9 0 9	24 7 3	−15 6 6	14th October 1931.	*Nil.*		
93 4 1	33 13 0	+59 7 1	5th July 1931.	8 carts ..	Bajri and Jowar.	
9 7 9	28 5 2	−18 13 5	17th October 1931.	*Nil.*		
56 12 8	26 13 6	+19 15 2	6th July 1931 and 7th July 1931.	7 carts ..	Jowar ..	† Including kadbi from ratoon crop.
57 14 8	31 14 3	+26 0 5	7th July 1931 and 8th July 1931.	*Nil.*	Jowar.	
74 15 10	36 , 3 2	+38 12 8	7th July 1931.	*Nil.*	Jowar ..	‡ Including kadbi from ratoon crop.
56 8 2	48 7 3	+8 0 11	6th July 1931.	7 carts ..	Guar and Udid.	

Statement of crops at the Northcote Cattle

Plot No.	Name of the area	Crop	Area of plot	Yield per acre	
				Principal product in lbs.	Bye-product in lbs.
			A. g.		
13	Old field ..	Jowar ..	2 0	470 grains.	*4,253 dry kadbi. 178 chaff.
14	Old field ..	Jowar ..	1 9	445 grains.	*6,720 dry kadbi. 150 chaff.
15	Old field ..	Jowar ..	1 0	370 grains.	*5,481 dry kadbi. 140 chaff.
16	Old field ..	Jowar ..	0 12	273 grains.	*6,277 dry kadbi. 100 chaff.
		Bajri ..	0 32	855 grains.	3,925 dry kadbi. 265 chaff.
17	Old field ..	Jowar ..	1 0	270 grains.	*4,885 dry kadbi. 100 chaff.
	Daba Field				
1	Daba field ..	Jowar ..	0 36	†22,494 green fodder.	....
2	Daba field ..	Jowar ..	1 10	†23,061 green fodder.	....
3	Daba field ..	Jowar ..	1 17	†26,927 green fodder.	....
4	Daba field ..	Jowar ..	4 0	†26,957 green fodder.	....
5	Daba field ..	Jowar ..	4 0	458 grains.	†5,871 green fodder. 4,284 dry kadbi. 175 chaff.
6	Daba field ..	Jowar ..	4 0	‡22,206 green fodder.	....
7	Daba field ..	Jowar ..	1 17	‡16,761 green fodder.	....

II—*contd.*

Farm, Chharodi, during the year 1931-32.

Value of produce per acre	Cost of cultivation per acre	Profit or loss per acre	Date of sowing	Manurial treatment per acre	Previous crop	Remarks
Rs. a. p.	Rs. a. p.	Rs. a. p.				
54 15 9	30 5 2	+ 24 10 7	6th July 1931.	*Nil.*	Bajri and Udid.	* Including kadbi from ratoon crop.
77 14 9	40 10 1	+ 37 4 5	6th July 1931.	*Nil.*	Jowar ..	Do.
64 6 6	41 10 5	+ 22 9 1	7th July 1931.	*Nil.*	Jowar ..	Do.
69 15 11	37 10 2	+ 32 5 9	6th July 1931.	*Nil.* 8 carts.	Udid ..	Do.
56 0 0	35 10 6	+ 20 5 6	6th July 1931 and 7th July 1931.	*Nil.*	Jowar ..	Do.
157 7 3	33 14 0	+123 9 3	12th July 1931 to 20th July 1931.	*Nil.*	Maize ..	* Including semi-green fodder which is converted into green.
161 6 9	39 0 10	+121 5 11	12th July 1931 to 20th July 1931.	*Nil.*	Maize ..	Do.
188 7 10	38 4 3	+150 3 7	12th July 1931 to 20th July 1931.	*Nil.*	Maize ..	Do.
188 11 2	37 14 1	+150 13 1	12th July 1931 to 20th July 1931.	*Nil.*	Maize ..	Do.
110 7 3	43 9 2	+ 66 14 1	12th July 1931 to 20th July 1931.	*Nil.*	Maize ..	Do. *Kadbi.*—Including kadbi from ratoon crop.
155 7 1	35 6 6	+120 0 7	12th July 1931 to 20th July 1931.	*Nil.*	Maize and fallow.	* Including semi-green fodder which is converted into green.
117 5 3	34 15 8	+ 82 5 7	12th July 1931 to 20th July 1931.	*Nil.*	Fallow ..	Do.

Plot No.	Name of the Area	Crop	Area of plot	Yield per acre	
				Principal product in lbs.	Bye product in lbs.
			A. g.		
1	Well field ..	Elephant grass	0 16	30,075 Green fodder.	....
2	Well field ..	Elephant grass	0 2½	43,568 Green fodder.	....
		Jowar ..	0 25	*25,463 Green fodder.	....
		Gram ..	0 12½	128 Grains.	192 Chaff.
		Oats and Peas.	0 25½	36,673 Green fodder.	....
3	Well field ..	Jowar ..	1 24	*20,382 Green fodder.	....
4	Well field ..	Berseem ..	0 21	38,057 Green fodder.	....
		Oats and Peas.	0 5	*24,440 Green fodder.	....
5	Well field ..	Maize and Chavli.	0 28	21,000 Green fodder.	....
		Jowar ..	2 4	16,131 Green fodder.	....
				1,440 Dry kadbi.	
6	Well field ..	Jowar ..	1 26	*21,822 Green fodder.	....

II—*concld.*

Field.

Value of produce per acre	Cost of cultivation per acre	Profit or loss per acre	Date of sowing	Manurial treatment	Previous crop	Remarks
Rs. a. p.	Rs. a. p.	Rs. a. p.				
150 6 0	168 0 2	— 17 6 2	....	*Nil.*	Elephant grass.	Old plantation, two cuttings only.
217 13 5	405 3 4	—187 5 11	20th July 1931.	48 Carts.	..	New plantation planted in July, yield from five cuttings only.
178 3 10	42 2 3	+136 1 7	10th and 11th July 1931.	*Nil.*	Fallow ..	It being a very small plantation appears rather a bit more costly.
5 15 5	63 13 4	— 57 13 11	19th October 1931.	29 Carts.	..	
366 11 6	247 12 10	+118 14 8	2nd December 1931.	16 Carts.	..	
142 10 9	48 8 8	+ 94 2 1	10th July 1931 and 11th July 1931.	*Nil.*	Fallow	* Including green fodder from ratoon crop.
456 10 11	414 9 6	+ 42 1 5	21st October 1931 to 26th October 1931.	37 Carts.	Oats and Peas.	
244 6 5	394 7 4	—138 1 2	21st October 1931. 23rd October 1931.	..	..	* Sown as a protection crop round Berseem.
210 0 0	272 15 10	— 62 15 10	20th March 1931.	9 Carts	Fallow.	
127 5 1	48 1 6	+ 79 3 7	10th July 1931. 11th July 1931.	11 Carts.	Maize and Chavli and Berseem.	Including green fodder from ratoon crop.
140 14 1	52 5 6	+ 96 14 11	10th July 1931. 11th July 1931.	*Nil.*	Fallow ..	* Including green fodder from ratoon crop.

APPENDIX III.

Statement showing details of Premium Bulls issued during the year 1931-32

Serial No.	Name of Village	Taluka	District	Name of Agent	Remarks
1	Asambli ..	Matar ..	Kaira ..	Chela Ghela Bharwad.	
2	Undrel ..	South Daskroi ..	Ahmedabad ..	Chuda Kunvarsi Rabari.	
3	Vanch ..	Do. ..	Do. ..	Karamsi Kalan Rabari.	
4	Dhamatwan ..	Do. ..	Do. ..	Kursi Doonger Rabari.	
5	Nanodra ..	Dholka ..	Do. ..	Desa Mala Bharwad.	
6	Rupavati ..	Sanand ..	Do. ..	Aja Ranchhod Bharwad.	
7	Ramol ..	South Daskroi ..	Do. ..	Madan Amtha Bharwad.	
8	Dakore ..	Thasra ..	Kaira ..	Manager, Temple Committee.	
9	Do. ..	Do. ..	Do. ..	....	
10	Do. ..	Do. ..	Do. ..	....	
11	Kodalia ..	Sanand ..	Ahmedabad ..	Malu Kala Bharwad.	
12	Lekhamba ..	Do. ..	Do. ..	Rana Punja Bharwad.	
13	Sanand ..	Do. ..	Do. ..	Natha Jagmal Rabari.	
14	Nilki ..	Viramgam ..	Do. ..	Naran Vana Bharwad.	
15	Vatrakgarh ..	Modasa Mahal.	Do. ..	Reva Sabhai Rabari.	
16	Fangdi ..	Sanand ..	Do. ..	Vishram Ecchar Bharwad.	

APPENDIX IV

APPENDIX

Statement showing age at first calving of the Heifers that calved

Serial No.	Daughters			
	Name	Date of birth and Brand No.	Sire	Age at first calving
				Yrs. Mths.
1	Ujol	18th January 1926 4	Mohan ..	5 2½
2	Vanzari	29th May 1927 .. 15	Do. ..	3 10½
3	Bhuver	25th May 1927 .. 12	Do. ..	3 11½
4	Ujol	5th June 1927 .. 16	Do. ..	3 11¼
5	Chandlee	17th February 1927 7	Do. ..	4 4
				21 3½ 4 3
6	Samli	16th April 1927 .. 103	Bhim ..	3 11¾
7	Meghan	12th January 1927 1	Do. ..	4 3¼
8	Bhuver	27th April 1927 .. 11	Do. ..	4 0
9	Vijali	3rd March 1927 .. 9	Do. ..	4 4¼
10	Nani	20th December 1925. 40	Do. ..	5 8
				22 3½ 4 5½
11	Rozi	13th December 1926. 40	Faterio ..	4 4½
12	Vijali	3rd November 1925 29	Do. ..	5 6¼
13	Kesar	26th May 1927 .. 14	Do. ..	3 11½
				13 10½ 4 7½
14	Padol	28th August 1927 24	Kevdo ..	4 3¾
15	Santu	23rd November 1927. 27	Do. ..	4 2¼
				8 6 4 3
16	Manori	24th January 1927 4	Bhuri ..	5 1
17	Selar	2nd February 1927 5	Do. ..	4 9
				9 10 4 11

IV.

during the year as compared with that of their respective Dams.

Dams

Name	Date of birth and Brand No.	Sire	Age at first calving
			Yrs. Mths.
Ujol	11th June 1916 .. 298	Kachari ..	4 11½
Vanzari	25th April 1921 .. 27	Do. ..	4 10½
Bhuver	9th November 1918 405	Navab ..	5 4
Ujol	21st December 1914 248	Zaver ..	4 6
Chandlee	31st August 1916 .. 311	Do. ..	7 10½
			27 6½
			5 6
Samli	5th March 1923 .. 9	Mohan ..	4 1½
Meghan	8th January 1922 .. 1	Chitram ..	4 0
Bhuver	21st January 1921 .. 1	Navab ..	4 6
Vijali	1st January 1920 .. 1	Do. ..	5 10
Nani	10th January 1922 2	Mohan ..	3 11
Rozi	22nd April 1921 .. 24	Moti ..	4 2½
Vijali	30th April 1913 .. 181	Mathurio ..	5 0
Kesar	4th May 1920 .. 17	Navab ..	5 7
			14 9½
			4 11½
Padol	28th January 1918 .. 361	Moti ..	4 5½
Santu	1st January 1919 .. 422	Sultan ..	5 2½
			9 8
			4 10
Manori	26th May 1915 .. 278	Hiro ..	5 11½
Selar	11th May 1921 .. 29	Kachari ..	4 2
			10 1½
			5 0¾

Appendix IV-A.

Statement showing effects of bulls on early calving : First—calvers 1925-26 to 1931-32 only taken into consideration.

Serial No.	Name of the bull	Number of cases examined during last seven years	Average age at which the daughters had their first calving	Average age at which Dams had their first calving	Improvement over Dam in breeding point	Remarks
			Y. m.	Y. m.	Y. m.	
1	Mohan ..	53	4 1½	5 5	1 3½	
2	Kachari ..	12	4 6½	5 8	1 1½	
3	Navab ..	8	5 .4	5 6½	0 2½	
4	Sultan ..	8	4 11½	5 4½	0 5	
5	Chitram ..	26	4 5½	5 9½	1 4	
6	Moti ..	3	4 10½	4 11½	0 ½	
7	Vadli ..	3	4 10	4 11½	0 1½	
8	Kanudo ..	9	4 1½	5 8½	1 6½	
9	Senduri ..	6	3 11½	5 5	1 5½	
10	Bhim ..	26	4 0	5 3½	1 3½	
11	Resham ..	3	3 11½	5 1	1 1½	
12	Faterio ..	5	4 5½	5 8	1 2½	
13	Kevdo ..	2	4 3	4 10	0 7	
14	Bhuri ..	2	4 11	5 0½	0 1½	

Appendix V.

Statement of Milk Production Month by Month at the Chharodi Farm.

Month	1930-31			1931-32			Remarks
	Milk yield	Number of cows milked	Average per cow	Milk yield	Number of cows milked	Average per cow	
	Lbs.			Lbs.			
April ..	9,093	29	313·5	8,935	29	308·1	
May ..	9,513	33	288·2	11,667	38½	303·1	*Note.*—Note the more uniform rise and fall of average production per cow per month during the year 1931-32 as compared with 1930-31.
June ..	9,177	37	275·0	11,995	42½	282·0	
July ..	13,384	40	334·6	13,767	44½	310·0	
August ..	12,579	38	331·0	16,738	43½	384·7	
September ..	11,467	35	327·6	13,357	40	333·9	
October ..	9,589	33	290·5	11,941	35	341·0	
November ..	7,813	32	244·1	9,068	30	302·4	
December ..	8,415	34	247·5	8,199	25½	321·4	
January ..	9,329	35	266·5	8,847	26	339·7	
February ..	9,260	32	289·3	8,191½	28	292·6	
March ..	7,708½	26	296·5	8,942½	30½	292·3	
Total ..	1,17,327½	..	..	1,31,648	..	..	

APPENDIX VI.

Statement showing milk yield of cows month by

Serial No.	1	2	3	4	5	6
Name of Cow with brand and year	Lili 449-1919	Meghan 1-1923	Samli 9-1923	Kachari 32-1920	Nasal 35-1924	Vanar 406-1918
Number of calving.	4	4 and 5	3 and 4	5 and 6	2	5 and 6
Date of calving ..	9th July 1930	18th July 1930 28th July 1931	10 August 1930 27th December 1931	6th September 1930 21st December 1931	22nd October 1930	5th November 1930 23rd January 1932
1931						
April ..	328½	205	86½	336½	307½	348½
May ..	315½	....	....	347	314½	307½
June ..	235½	....	....	325½	304½	237½
July ..	82½	49½	....	301	320½	67½
August ..	....	603½	....	360½	422	....
September ..	....	579½	....	104½	321½	....
October ..	....	623½	....	....	286½	....
November ..	....	543½	....	....	126½	....
December ..	....	540	54	102½	....	....
1932						
January ..	....	457½	550	388	....	82½
February ..	....	401	454½	393½	....	188½
March ..	....	412½	531	428½	....	227
Total for 1931-32 ..	961½	4,415	1,676	3,087½	2,403½	1,459
Total of lactation, Brought forward.	3,233½	4,766½	2,273½	2,643½	1,560	1,657½
Total of whole lactation.	4,194½	4,971½	2,360½	4,419	3,963½	2,618½
Total of lactation, Carried over.	....	4,210	1,589½	1,312½	....	498½

VI.

month for 1931-32 (Chharodi Farm).

7	8	9	10	11	12	13
Vanzari 11-1921	Gomti 36-1923	Vanar 1-1925	Selar 29-1921	Medhi 12-1925	Ranchhi 38-1921	Santu 422-1919
4 and 5	3	2 and 3	5 and 6	2	4	6
9th November 1930 19th March 1932	26th November 1930	15th December 1930 4th January 1932	16th December 1930 15th January 1932	17th December 1930	17th December 1930	18th December 1930
169	386	349½	588½	198½	196	298
235½	334½	333½	582	208½	222	317½
180	286½	271	424½	217	230	278½
223½	374	83½	360½	299½	267½	275½
64½	489	....	271½	382	290½	325½
....	407½	....	80	275	258½	251
....	297½	....	....	235	243½	159½
....	....	....	....	158½	168	....
....	....	....	....	57½	20	....
....	....	121	254	....	....	....
....	....	169	435	....	....	....
78	....	206½	478½	....	....	....
950½	2,575½	1,582½	3,424	2,032	1,896½	1,905½
1,248½	1,681	718½	1,764½	656½	669	538½
2,120½	4,256½	1,756½	4,021	2,688½	2,565½	2,444
78	....	495½	1,167½	....	....	....

Statement showing milk yield of cows month by

Serial No.	14	15	16	17	18	19
Name of Cow with brand and year	Padol 16-1926	Bhuri 15-1924	Ravti 20-1921	Ujol 298-1916	Kesar 392-1918	Vanzari 27-1923
Number of calving.	1 and 2	3 and 4	4	8 and 9	6 and 7	3 and 4
Date of calving ..	20th December 1930 16th February 1932	21st December 1930 23rd March 1932	25th December 1930	25th December 1930 29th January 1932	28th December 1930 2nd February 1932	31st December 1930 20th December 1931
1931						
April ..	430½	236½	570½	193½	223½	516½
May ..	443½	297½	657½	214½	275	447
June ..	367½	304½	511½	227½	264½	339½
July ..	294	377	376	281	317½	222
August ..	275½	434½	330½	300½	374½	117½
September ..	231½	354½	225	179½	197½	....
October ..	313½	348	80½	69½	....	....
November ..	255½	282½	....	....	....	....
December ..	43	158½	....	....	....	158
1932						
January ..	....	....	....	20½	....	557½
February ..	140	....	....	187½	136	445
March ..	356½	80½	....	211½	209½	472
Total for 1931-32 ..	3,150½	2,874½	2,752	1,874½	2,057½	3,275
Total of lactation, Brought forward.	1,041	968½	1,968½	519½	607	1,239
Total of whole lactation.	3,695	3,762½	4,720½	1,974	2,259	2,881½
Total of lactation, Carried over.	496½	80½	....	420	405½	3,162½

VI—*contd.*

onth for 1931-32 (Chharodi Farm)—contd.

20	21	22	23	24	25	26
Laxmi 34-1921	Vijali 14-1923	Chokhli 5-1925	Gomti 27-1926	Kesar 2-1924	Padol 361-1918	Bodli 15-1925
4 and 5	3	3	1	4 and 5	8	2
8th January 1931 13th March 1932	2nd February 1931	17th February 1931	3rd March 1931	7th March 1931 16th March 1932	20th March 1931	19th March 1931
196¾	472	309½	174½	280½	191½	156½
212¾	464½	299½	206½	278½	210	206½
204	462	276¾	202½	262	184½	102
285¾	492	301½	316	295½	157½	208½
337½	573½	369	363¾	386½	216½	406¾
205½	546½	308½	349½	250	....	330½
98	599½	337	371¾	....	....	320¾
....	553	291¾	340	....	....	288¾
....	478¾	268¾	354	....	....	270¾
....	396	167	125½	....	....	301¾ Sold
....	104½	127½	....	....	....	....
147½	....	....	....	108	....	....
1,687½	5,141½	3,056½	2,803½	1,860¾	959½	2,778¾
648	821½	435½	168	235½	55½	....
2,188	5,963	3,491½	2,971½	1,988	1,014¾	2,778¾
147½	....	....	....	108	....	....

Statement showing milk yield of cows month by

Serial No.	27	28	29	30	31	32
Name of Cow with brand and year	Nasal 437-1919	Ujol 4-1926	Samli 26-1924	Vanzari 15-1927	Bodli 33-1926	Bodli 324-1917
Number of calving.	5	1	3 and 4	1 and 2	2	7
Date of calving ..	30th March 1931	2nd April 1931	5th April 1931 28th March 1932	7th April 1931 21st March 1932	14th April 1931	16th April 1931
1931						
April ..	22½	217½	243½	229½	196½	158½
May ..	....	343½	118½	357½	368½	236
June ..	....	433½	....	332	326½	244½
July ..	....	416½	....	386½	347½	275½
August ..	....	541	....	348½	445½	364½
September ..	....	552½	....	316½	362½	313
October ..	....	570½	....	325	360½	347
November ..	....	543½	....	266½	315½	314½
December ..	....	452	....	183	338½	315
1932						
January ..	....	446½	....	....	389½	367½
February ..	....	387½	....	....	332½	408½
March ..	....	165½	27	102	315	389½
Total for 1931-32 ..	22½	5,068½	389½	2,846½	4,093½	3,704
Total of lactation Brought forward.	....	....	....	....	....	....
Total of whole lactation.	22½	....	362½	2,744½	....	....
Total of lactation Carried over.	....	5,068½	27	102	4,093½	3,704

VI—*contd.*

month for 1931-32 (Chharodi Farm)—contd.

33	34	35	36	37	38	39
Meghan 1-1927	Vijali 16-1924	Bhuver 11-1927	Padol 45-1923	Rozi 40-1926	Kesar 41-1925	Vanar 10-1920
1	2	1	5	1	2	5
17th April 1931	29th April 1931	23rd April 1931	1st April 1931	30th April 1931	3rd May 1931	7th May 1931
106½	12	....	....	....	....	....
231½	274½	184	125	189½	240½	309
174	285½	164½	102½	214½	184	894½
182½	342	160½	196	254	102½	429½
261½	444½	226½	282	324½	288½	474½
224½	382½	218	320½	285	283½	378½
238½	306	243½	276½	265½	252½	370½
182½	249½	206½	68½	243½	140½	326½
....	228	26½	....	118½	....	296½
....	298	....	....	....	....	300½
....	140½	....	....	....	....	214½
....	....	....	....	....	....	226½
1,550½	2,912½	1,430	1,372	1,889	1,581½	3,724½
....	....	....	....	....	....	
1,550½	2,912½	1,430	1,372	1,889	1,581½	....
....	....	....	....	....	....	3,724½

Statement showing milk yield of cows month by

Serial No.	40	41	42	43	44	45
Name of Cow with brand and year	Bhuver 12-1927	Vijali 29-1925	Ujoi 16-1927	Lilor 9-1922	Vanzari 27-1921	Patoli 18-1925
Number of calving	1	1	1	4	5	3
Date of calving ..	8th May 1931	9th May 1931	13th May 1931	14th May 1931	16th May 1931	8th June 1931
1931						
April ..	..	....	....	....	....	....
May ..	185½	340	147½	181	159½	....
June ..	250½	621½	287½	293½	282	194
July ..	267½	640½	336	325½	326	414½
August ..	318½	683½	459½	373½	406½	380½
September ..	292½	601	350½	311½	363½	295
October ..	280½	628½	222½	313½	240½	292½
November ..	220½	543½	100½	246	227½	261½
December ..	249	541½	....	247½	205½	264
1932						
January ..	187	477½	....	236½	87	247½
February ..	23½	411	....	34	....	113½
March ..	..	239	....	....	....	....
Total for 1931-32 ..	2,274½	5,728½	1,903½	2,562	2,298½	2,468½
Total of lactation, Brought forward.	..	....	....	....	....	....
Total of whole lactation.	2,274½	5,728½	1,903½	2,562	2,298½	2,468½
Total of lactation, Carried over	..	....	....	....	....	....

VI—*contd.*

month for 1931-32 (Chharoli Farm)—contd.

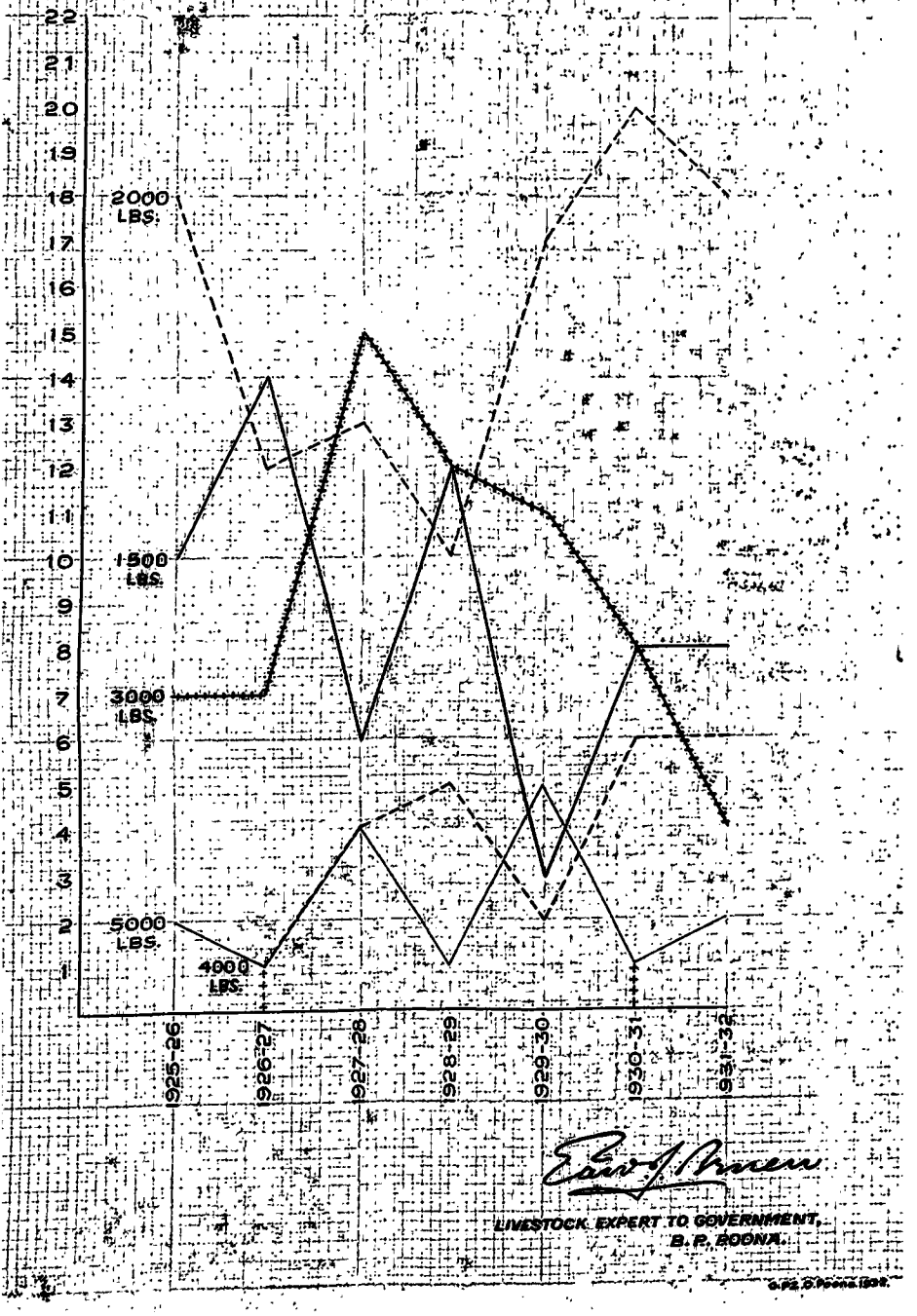
46	47	48	49	50	51	52
Badam 28-1924	Chandlee 7-1927	Chanothi 1-1924	Nasal 4-1925	Bhuver 333-1917	Padol 6-1925	Kachari 14-1926
3	1	4	3	8	3	2
12th June 1931	18th June 1931	19th June 1931	21st June 1931	28th June 1931	6th July 1931	25th July 1931
....	....	....	....	....	....	....
....	....	....	....	....	....	....
214½	61½	79½	86½	20½	....	....
473½	188½	20½	233	352	214½	73½
509½	222½	....	287	501	369	524½
387	204½	....	249	374½	305½	635½
329½	213½	....	267	269	288½	646½
261½	137	....	261½	214	208½	552½
278½	....	....	299½	232	162½	493½
240½	....	....	308	113½	....	429½
303½	....	....	345½	....	....	340½
407	....	....	366½	....	....	328½
3,423½	1,028	100½	2,704	2,076½	1,548½	4,025½
....	....	....	....	....	....	....
....	1,028	100½	....	2,076½	1,548½	....
3,423½	....	....	2,704	....	....	4,025½

Statement showing milk yield of cows month by

Serial No.	53	54	55	56	57
Name of Cow with brand and year	Ujol 7—1925	Selar 21—1925	Padol 24—1927	Bhotu 33—1921	Renchhi 33—1925
Number of calving	3	2	1	5	2
Date of calving	30th November 1931.	6th December 1931.	18th December 1931.	5th January 1932.	28th January 1932.
1931					
April	....	....	....	....	....
May	....	....	....	....	....
June	....	....	....	....	....
July	....	....	....	....	....
August	....	....	....	....	....
September	....	....	....	....	....
October	....	....	....	....	....
November	....	....	....	....	....
December	305½	368½	93	....	....
1932					
January	308½	462½	319½	161½	28
February	272½	346½	311	179½	178½
March	313½	215	318½	200½	190½
Total for 1931-32	1,195½	1,386½	1,042	541½	396½
Total of lactation, Brought forward.	....	....	....	....	....
Total of whole lactation.	....	....	....	....	....
Total of lactation, Carried over.	1,195½	1,386½	1,042	541½	396½

NORTHCOTE CATTLE FARM, CHHARODI.

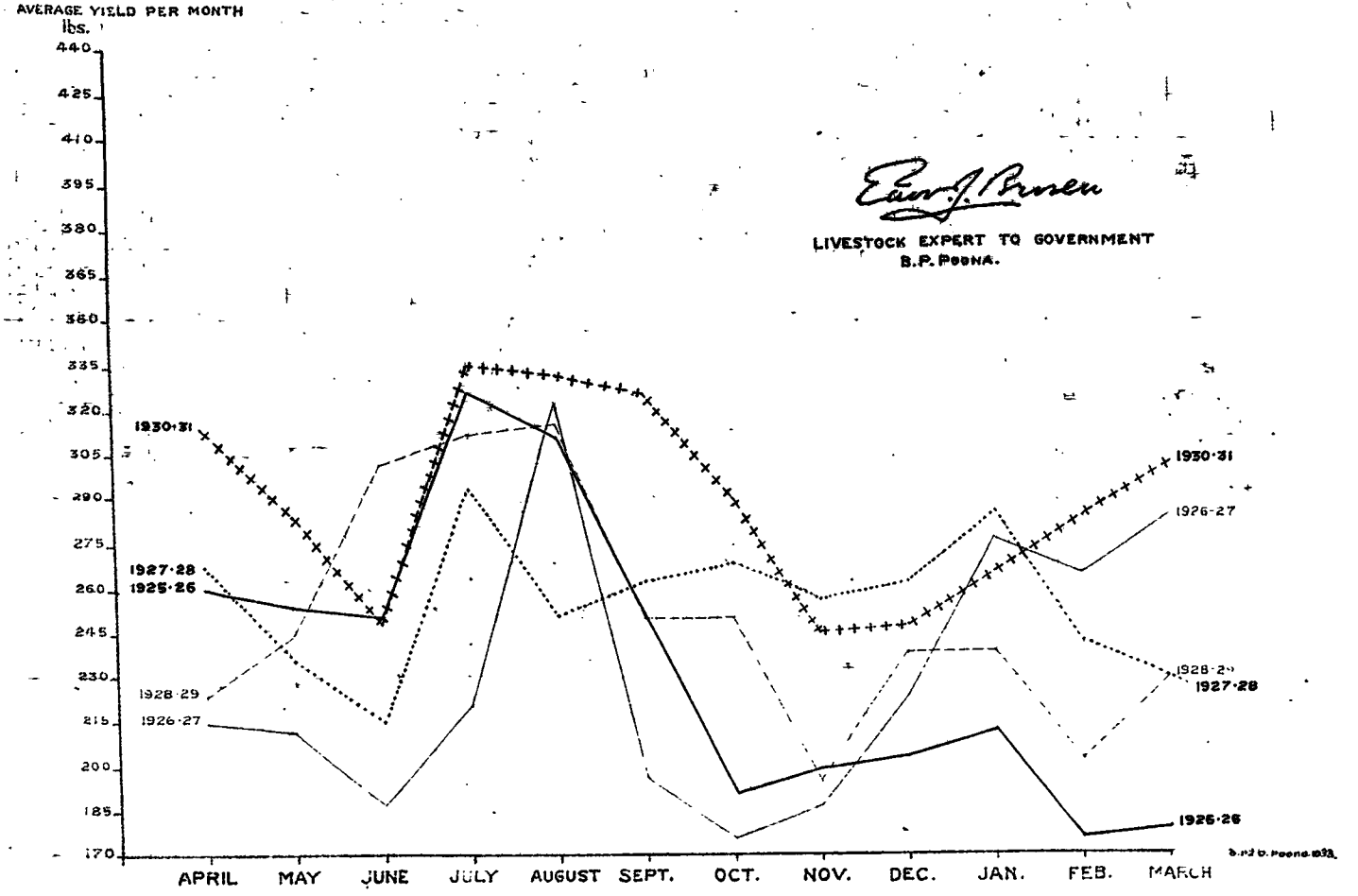
GRAPH SHOWING NUMBER OF COWS THAT HAVE YIELDED FROM 1500 LBS, ONWARDS DURING EACH YEAR.



Edward J. Procter

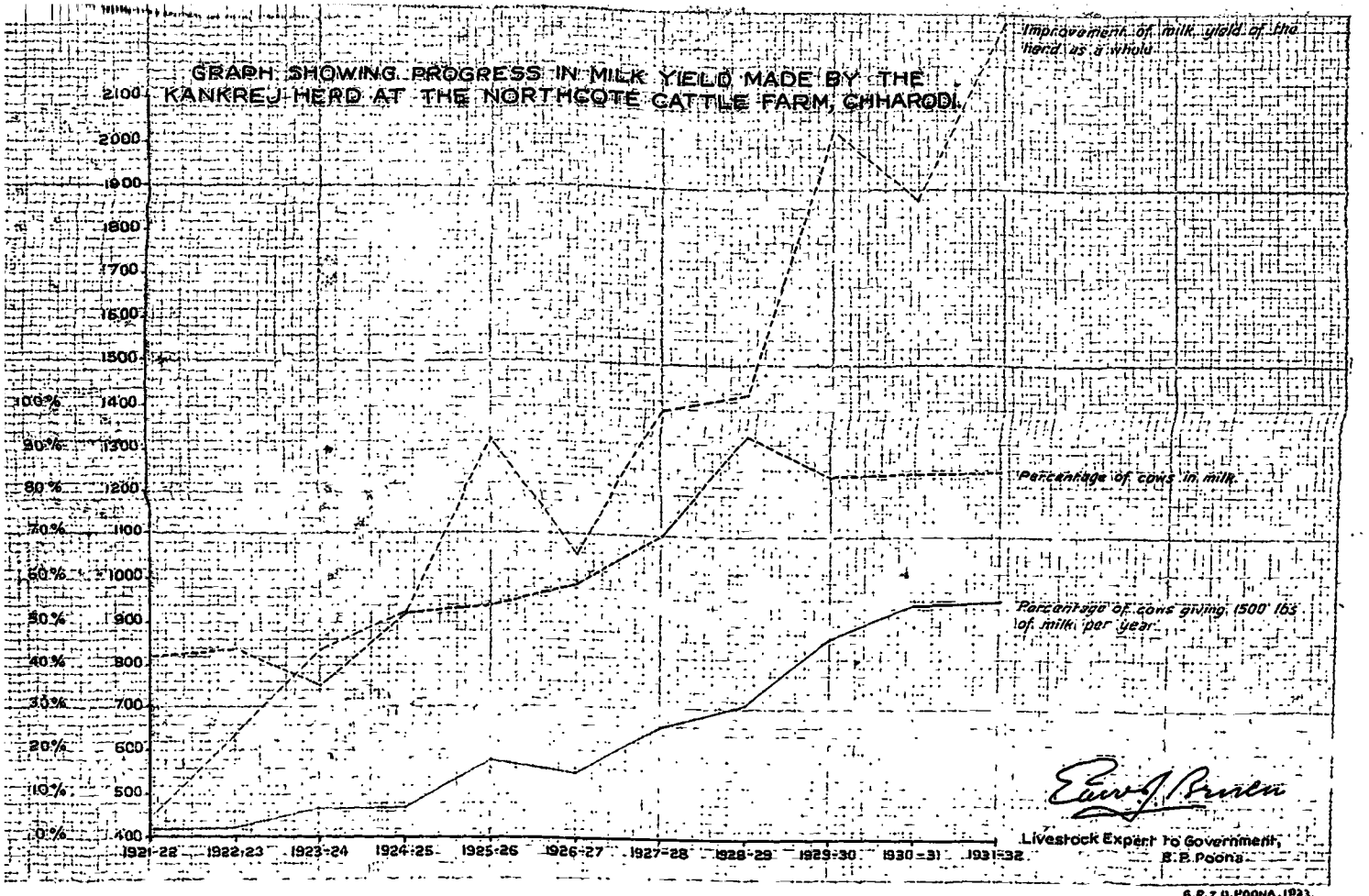
LIVESTOCK EXPERT TO GOVERNMENT,
B. P. BOONA.

GRAPH SHOWING AVERAGE MONTHLY MILK YIELD PER COW, MONTH BY MONTH



Evan J. Brown

LIVESTOCK EXPERT TO GOVERNMENT
B.P. POONA.


GRAPH SHOWING PROGRESS IN MILK YIELD MADE BY THE KANKREJ HERD AT THE NORTHCOTE CATTLE FARM, CHHARODI.
Improvement of milk yield of the herd as a whole
Percentage of cows in milk.
Percentage of cows giving 1500 lbs of milk per year.
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1921-22
1922-23
1923-24
1924-25
1925-26
1926-27
1927-28
1928-29
1929-30
1930-31
1931-32
Livestock Expert to Government, B.P. Poona.
G.P.S.O. POONA, 1933.

VI—*concld.*

month for 1931-32 (Charodi Farm)—concld.

58	59	60	61	62	63	64
Lilor 6—1926	Bhotu 37—1925	Santu 27—1927	Nasal 30—1926	Chokhli 3—1921	Manori 4—1927	Chakli 17—1926
2	2	1	2	6	1	2
20th January 1932.	3rd February 1932.	11th February 1932.	19th February 1932.	22nd February 1932.	26th February 1932.	16th March 1932.
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
....	....	....	....	....	....	....
20½	....	....	....	....	....	....
131½	187½	114½	81½	42	....	....
149½	240½	169½	244½	114½	172½	101
351½	427½	284½	326½	156½	172½	101
....	....	....	....	....	....	....
351½	....	....	....	156½	....	....
....	427½	284½	326½	....	172½	101

Statement showing the crops grown, yield value and

Plot Nos.	Area.	Name of Crops.	Manure put.	Yield of Crops.			
				Grain fodder.		Dry fodder.	
				Per plot.	Per acre.	Per plot.	Per acre.
	A. G.			lbs.	lbs.	lbs.	lbs.
5, 6, 7 and 8.	8 15	Maize	98	150,208	18,776	..	..
2 and 5 ..	8 2	Jowar	68	15,600	1,950	76,825	9,603
1 and 4 ..	10 14	Bajri	104	506,166	56,016	..	..
3, 4 and 8	10 0	Kulthi (after Bajri and Maize).	..	12,700	1,370	22,530	2,253
6A ..	0 5	Lucerne	2	4,727	37,816	..	..
3A ..	0 25	Guinea and Elephant-grass	9	10,115	16,184	..	..
Miscellaneous.	0 35	Gordura and Jaragway grass.	..	840	960	..	..
	28 16		281				

VII.

expenditure, etc. during the year (Bankapur Farm).

Crops.		Value of out-turn.		Cost of cultivation.		Profit.	Loss.	Remarks
Grains.		Per plot.	Per acre.	Per plot.	Per acre.			
Per plot.	Per acre.							
lbs.	lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(35 Gts.) 2,533	2,896	1,044 10 1	117 10 0	539 9 8	67 6 0	401 11 5	..	
1,089	211	291 10 0	57 0 0	323 13 8	40 0 0	127 11 10	..	
(30 Gts.) 220	293	2,174 12 8	217 7 3	783 6 3	123 0 0	1,391 4 5	..	
7,000	700	573 12 9	57 6 0	254 4 0	25 6 9	318 8 3	..	
..	..	31 7 6	251 12 0	22 12 4	182 2 8	8 11 2	..	
..	..	67 6 11	129 6 6	42 1 6	67 5 7	25 5 5	..	
..	..	4 3 2	4 10 11	38 10 7	44 2 11	..	34 7 5	
		4,187 15 1		2,004 12 6		2,183 2 7	3 7 5	

Statement showing average yield of eggs of different

No. of Hen	Breed.	Date of start.	November.	December.	January	February.
1	White Leghorn	16th November 1931.	7	8	15	18
2	Wyandotte	Do. ..	4	26	25	28
3	White Leghorn	Do. ..	12	20	22	19
4	Rhode Island Red	Do.	11	20	22	21
5	White Leghorn	Do. ..	11	8	14	17
6	Wyandotte	Do. ..	8	16	3	4
7	White Leghorn	Do. ..	11	12	8	18
8	Rhode Island Red	Do. ..	8	21	23	20
9	White Leghorn	Do. ..	11	25	22	20
10	Wyandotte	Do. ..	9	23	13	15
11	White Leghorn	Do. ..	11	23	21	20
12	Rhode Island Red	Do. ..	12	23	24	22
13	White Leghorn	16th December 1931.	..	3	21	19
14	Wyandotte	Do. ..	..	20	9	10
15	White Leghorn	Do. ..	..	15	20	25
16	Rhode Island Red	Do. ..	..	9	7	17
17	White Leghorn	Do. ..	..	13	15	14
18	Rhode Island Red	Do. ..	..	20	21	20
19	White Leghorn	1st January 1932 ..	..	..	15	15
20	Australorp	Do. ..	..	..	17	16
21	White Leghorn	Do. ..	..	..	15	20
22	Rhode Island Red	Do. ..	..	..	16	15
23	White Leghorn	Do. ..	..	..	12	21
25	Australorp	Do. ..	..	..	13	12

VIII.

breeds at the Central Poultry Farm, Kirkee.

March.	April.	May.	June.	Total.	Average yield per bird per month.				Remarks.
					White Leghorn.	White Wyandotte.	R. I. R.	Australorp.	
20	18	18	18	122					Total number of eggs of different breeds.
21	19	15	18	151					
22	20	21	23	159					
20	15	11	9	129					W. L. 1,438
16	18	16	15	115					Wyandotte 389
1	..	..	..	32	17	13	18	..	R. I. R. 671
9	10	7	5	75					Australorp 140
14	14	14	19	133					2,638
20	22	21	17	158					
11	9	18	11	109					
14	13	14	14	130					
11	13	17	18	140					
17	20	13	14	112					
18	8	17	15	97					
22	17	19	21	139					
13	7	9	13	80	18	15	15	..	
16	15	18	17	108					
20	11	8	12	112					
17	14	20	16	97					
8	12	11	13	77					
21	22	21	19	118					
14	13	9	10	77	19	..	14	12	
20	17	19	16	105					
10	7	8	13	63					
Average yield per bird per month					18	14	16	12	

APPENDIX IX.

Statement showing the Incubation Results at the Central Poultry Farm, Kirkee.

Serial No.	Date of Hatch	Kind of Incubator	Total charge	Percentage of Infertiles	Percentage of Hatch of the total charge	Percentage of Hatch of the Fertiles	Remarks
1	5th November 1931.	Buckeye ..	51	100	..	..	Eggs used from the newly mated pens under moult, hence germless.
2	12th November 1931.	Phipp's ..	65	61·5	20·0	52·0	Do.
3	19th November 1931.	Buckeye ..	41	26·8	26·8	36·6	Do.
4	25th November 1931.	Hearson's (small)	55	32·7	25·5	38·0	Do.
5	4th December 1931.	Hearson's (big) .	64	40·6	43·7	73·7	
6	11th December 1931.	Phipp's ..	33	9·1	54·5	60·0	
7	17th December 1931.	Hearson's (small)	50	24·0	46·0	60·5	
8	25th December 1931.	Hearson's (big)	85	20·0	50·6	63·2	
9	3rd January 1932.	Phipp's ..	81	29·6	44·4	63·1	
10	8th January 1932.	Hearson's (small)	53	43·4	22·6	40·0	10 to 12 days old eggs, hence a poor hatch.
11	17th January 1932.	Do. (big)..	100	33·0	40·0	59·7	
12	25th January 1932.	Phipp's ..	65	20·0	49·2	61·5	
13	31st January 1932.	Hearson's (small)	52	26·9	53·8	73·7	
14	9th February 1932.	Do. (big) ..	108	26·0	46·3	62·5	
15	16th February 1932.	Phipp's ..	92	34·8	43·5	66·6	
16	21st February 1932.	Hearson's (small)	50	22·0	36·0	46·1	12 Days old eggs, besides the uneven temperature of the room etc.
17	1st March 1932.	Do. (big)	115	40·8	37·4	63·2	
18	8th March 1932.	Phipp's ..	94	24·5	42·6	56·3	Uneven temperature and stale eggs etc.
19	13th March 1932.	Hearson's (small)	76	29·0	50·1	70·4	

APPENDIX X.

Statement showing stock of birds, chicks and settings of eggs supplied to

Government Station	Number of setting eggs	Number of birds or chicks
Head Master, Agricultural School, Bordi	30	
Agricultural School, Loni	45	
Agricultural Depot, Nandgaon	30	
Agricultural Overseer, Palghar, District Thana		5 Cockerels .. ..
Head Master, Agricultural School, Dhulia		1 Cock .. ..
Manager, Settlement, Bijapur		1 Cock .. ..
		1 Hen .. ..
Total ..	105	8

X.

Government Stations and Out-Stations. (*Central Poultry Farm, Kirkee*)

Out-Station	Number of Setting eggs	Number of birds or chicks
Ujjain (C. I.)	30	....
Bhilsa	15	....
Satara	15	....
Karjat	..	12 chicks.
Belgaum	15	....
Nasik	..	1 cockorel.
Dharwar	15	....
Belapur	..	2 cockorels.
Shahabad	45	....
Hyderabad (Deccan)	..	2 cockerels, 6 hens and 2 chicks.
Talpur (Sind)	15	2 cocks and 12 hens.
Bombay	30	1 cock, 6 hens and 12 chicks.
Chembur (Bombay)	10	....
Amalner	15	1 cock.
Ainahar (district Ahmednagar) ..	..	1 cockorel, 4 pullets,
Poona	168	4 cocks, 24 hens and 100 chicks.
	373	198

APPENDIX XI.

Statement showing the Transaction of eggs during the year at the Central Poultry Farm, Kirkee.

Month	Used for hatching	Sold for hatching	Amount	Sold for table	Amount	Fed, broken and replaced	Total disposal	Remarks
			Rs. a. p.		Rs. a. p.			
April ..	..	..	....	617	42 5 0	23	640	
May ..	..	..	....	511	34 15 0	5	516	
June ..	..	..	....	508	31 12 0	49	557	
July ..	..	..	....	508	37 0 0	10	617	
August ..	..	..	....	516	43 0 0	4	520	
September ..	..	..	....	423	35 4 0	3	426	
October ..	157	15	12 0 0	405	33 12 0	2	579	
November ..	202	81	66 0 0	534	44 6 0	9	825	
December ..	310	122	88 0 0	642	53 8 0	7	1,090	
January ..	367	194	137 0 0	480	40 0 0	5	1,046	
February ..	285	68	27 0 0	691	47 12 0	20	1,064	
March ..	..	..	....	702	48 12 0	17	809	
Total ..	1,330	480	325 0 0	6,717	489 14 0	163	8,690	

Appendix XII.

Statement showing the average yield of different breeds during the year at the Central Poultry Farm, Kirkee.

Breed and Strain.	Average number of birds laying per month.	Month						
		April.	May.	June.	July.	August.	September.	October.
Wyandotte ..	10·4	97	31	48	74	57	63	78
Rhode I. Reds ..	15·6	75	100	90	76	74	72	107
Australorp ..	8·7	52	49	78	95	113	132	70
Basra ..	2·0	42	20	22	20	9	..	..
White Leghorn—								
Prince of Wales and Ransford.	12·2	210	156	164	155	108	59	157
Canadian ..	7·6	109	94	113	99	83	56	85
Goodwin Preece	8·5	72	70	65	80	75	56	116

Breed and Strain.	Average number of birds laying per month.	Month—*contd.*					Average yield per bird per month.	Average yield per bird per year
		November.	December.	January.	February.	March.		
Wyandotte ..	10·4	130	201	162	135	160	9·9	118·8
Rhode I. Reds ..	15·6	210	350	408	303	286	11·5	138·0
Australorp ..	8·7	38	52	48	36	19	7·3	90·0
Basra ..	2·0	..	..	..	..	..	3·5	42·0
White Leghorn—								
Prince of Wales and Ransford.	12·2	208	214	202	198	229	14·0	168·0
Canadian ..	7·6	71	106	132	110	50	12·1	145·2
Goodwin Preece	8·5	176	202	204	156	110	13·5	162·0

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Appendix XIII.

Statement showing the Live-stock transaction during the year at the Central Poultry Farm, Kirkee.

Month.	Number hatched.	Died and Destroyed.		Sold.	
		Adults.	Chicks.	Adults.	Amount realized.
					Rs. a. p.
April	..	8	25	..	....
May	..	2	9	3	22 0 0
June	..	5	14	12	52 15 9
July	..	1	2	7	47 8 0
August	..	2	..	12	44 0 0
September	..	..	..	..	....
October	..	1	..	..	....
November	38	1	9	5	40 0 0
December	109	1	4	..	....
January	148	..	8	1	6 0 0
February	108	1	2	33	260 0 0
March	82	2	9	1	5 0 0
Total ..	485	24	77	74	477 7 9

Month.	Number hatched.	Sold—*contd.*		Purchased or Received.	Remarks.
		Chicks.	Amount realized.		
			Rs. a. p.		
April	..	..	..	..	
May	..	..	..	..	
June	..	29	25 4 0	..	
July	..	8	3 0 0	..	
August	..	20	32 0 0	..	
September	..	2	3 0 0	..	
October	..	4	40 0 0	..	
November	38	1	2 0 0	..	
December	109	..	..	..	
January	148	12	24 0 0	..	
February	108	29	36 0 0	5	5 R. I. Reds (1 cock and 4 hens) received by transfer from the Agricultural School, Loni.
March	82	32	42 0 0	..	
Total ..	485	122	257 4 0	..	

Appendix XIV.

Statement showing the strength of flock during the year.
(Central Poultry Farm, Kirkee.)

Serial No.	Breed (Adults).	Sex.		Total.	Breed (Chicks).	Total.	Grand Total of flock.	Remarks.
		Cocks.	Hens.					
1	White Leghorn	3	23	26	White Leghorn	117	402	
2	Australorp ..	..	2	2	Australorp ..	40		
3	Rhode Island Red.	3	24	27	Rhode Island Red.	130		
4	Wyandotte ..	2	10	12	Wyandotte ..	46		
	Total ..	8	59	67		342		

APPENDIX XV.

Statement showing number of stud birds put out in the district during the year 1931-32.

Serial No.	Name of Division.	Number of stud birds put out in 1930-31.	Number of stud birds put out in 1931-32.
1	N. D. (Including Bombay and Suburbs)	11	21
2	N. C. D.	2	3
3	S. C. D.	17	16
4	S. D.	1	1
5	Sind	..	4
6	Native States	..	3
	Total	31	48

PROGRAMME OF WORK UNDER THE LIVE STOCK EXPERT TO GOVERNMENT, POONA, FOR THE YEAR 1932-33.

I. *Breeding Farms.*—The policy of breeding up reliable pure strain of cattle will continue, keeping in mind the production of a more economical animal, which will mature early and calve more regularly. The breeding of a good dual and draught purpose animal on the above lines will continue at Chharodi and Bankapur respectively.

II. (*a*) Investigations and experiments will be conducted on the various food-stuffs as far as finances will permit.

(*b*) The cost of raising "B" class bulls purchased in "A" Zone will continue.

III. (*a*) Propaganda in connection with the spreading of the use and benefits of pedigree bulls will continue together with the teaching of better methods of care.

(*b*) The Herd Register introduced last year will continue, the idea being to number in one ear and the initials of the village in the other of all the pure cattle of each breed. Thus in a few years we shall have all the purer types of cattle pedigreed, as we shall know the dams and sires. Moreover, we shall be able to trace progeny of Premium bulls. This method will be advantageous to breeders, as they can with the Certificate supplied prove their animals to be well bred.

IV. The co-operation with the Kandivlee Gowrakshak Mandali will continue in breeding, raising and spreading in towns the Gir breed, which is very useful for this purpose, together with the fine illustration of what can be done if the people are so inclined with Pinjrapoles to make them useful institutions to the country instead of the burden they are at present.

V. The laying out of permanent irrigated pastures at Betagaon and to work out the economic value of same.

VI. The co-operation with the Sangli Industrial and Agricultural School, Sangli, in improving goats on a small scale will continue.

VII. Further extension in making popular the use of silage.

VIII. Experiments in growing fodder crops on farms will continue.

IX. *Poultry.*—(*a*) The work of breeding suitable foreign breeds of poultry will continue on the Government Central Poultry Farm, Kirkee.

(*b*) Investigations regarding inoculation, control of diseases and feeding of poultry.

(*c*) To help and advise poultry breeders as far as it is possible.

(*d*) Experiments in the egg laying capacity of different breeds in single testing pens will continue.

E. J. BRUEN,

Live Stock Expert to Government,
Bombay Presidency, Poona.

Poona, 25th July 1932.

APPENDIX O.

Summary of Work done by the Agricultural Engineer to Government, Bombay Presidency, for the year 1931-32.

Mr. W. M. Schutte, the Agricultural Engineer to Bombay Government, held charge of the Agricultural Engineer's post up to 19th September 1931 prior to his proceeding on long leave preparatory to retirement and Mr. C. G. Paranjpe, Assistant Agricultural Engineer to Government, officiated in his place from 20th September 1931 to 1st March 1932. Mr. V. Y. Chitale, Boring Overseer, acted as Assistant Agricultural Engineer during this period. The post of the Agricultural Engineer has been kept in abeyance from March 1st, 1932, due to retrenchment and consequently the Agricultural Engineering section had to be conducted by Mr. Paranjpe in his capacity as Assistant to Agricultural Engineer. There was a further retrenchment in staff which reduced the strength of the section by 9 permanent hands. This naturally has resulted in a great handicap and has involved excessive strain on the existing staff as the bulk of work has been considerably heavy.

Advice.

In spite of the trade depression and the general fall in prices of farm products, the number of inquiries has been on the increase. These were 93 this year against 45 of the last year. Out of the 93 inquiries, 32 are for pumping, 2 for threshing and winnowing, 2 for cane crushing, 3 for sugar making machinery, 1 for ginning, 1 for chaff-cutting, 9 for tractor ploughing, 4 for fencing, 1 for oil mill, 31 for boring and 7 for miscellaneous subjects. Only 4 students completed the course of engine driving at the Oil Engine class this year.

New works and special experiments.

I had the opportunity of designing and building Graduate quarters Non-Graduate quarters, Cooly lines, Cattle sheds, Combined Implement and Stores shed, and a Laboratory for the New Agricultural Research Station, Padegaon, and in addition to erect a special type of fencing all over the area aggregating a total length of 2 miles and 1 furlong approximately. The estimated cost of the buildings amounts to Rs. 22,000 and that of fencing to Rs. 4,000.

The work in connection with the water supply for the Farm quarters, and the Public Works Department quarters is in progress together with the erection of an elevated tank and tower for the 2 laboratories, one at the Farm and the other at the Public Works Department buildings for the scientists.

The station is going to be fitted with an up-to-date water-measuring outfit consisting of two rotary meters and a standing wave flume to accurately measure the quantity given to each plot under replication. It

is decided to irrigate through the meters 72 plots of 1·6 gunthas each every year for experimental purposes and in order to facilitate accurate measurement the following arrangement of distribution through suitable Hume Pipes and Hydrants is being adopted.

The water from the canal will be first taken into a receiving tank fitted with strainers and thence it will be carried through a 10″ Hume pipe line parallel to the plots. The 10″ line will be provided with 7 reinforced concrete sinks or Hydrants at suitable distances and from each of the first 6 sinks, measured water will be taken to a 6″ branch of Hume Pipes through a 4″ rotary meter at right angles to the main line to irrigate the plots. The last or the seventh sink is being used for an over-flow. Each of these six 6″ branch lines will be fitted with 6 sinks which will command 12 plots (6 on each side). These sinks will be fitted with special outlets and a flap valve to shut off or open the water instantaneously. The outlets are specially designed for instantaneous work and the whole arrangement was tried at the shops and demonstrated to the Director of Agriculture and the Agriculturist Officer. The Hume Pipe lines will be 18″ below ground so as to facilitate ploughing. The laying of the pipes will be undertaken within a month's time.

We are going to have at Padegaon a 3-ton cart weigh-bridge for weighing cane and a power cane crushing plant consisting of a 32 B. H. P. Blackstone Spring Injection type low speed crude oil engine, No. 192 and No. 145 Chattanooga 3 roll mills with feeder, bagasse carrier and juice pumps, a countershaft and a complete juice boiling arrangement including a Gurhal House and the machinery shed. The weigh-bridge and the machinery have been purchased and their erection with suitable sheds is in progress.

In addition to the work at Padegaon I had an opportunity to help Dr. Uppal in designing and building a glass house measuring 30′×22′ at the Agricultural College, Poona.

I have to note an experiment we undertook at the instance of the Director of Agriculture, Poona. We transplanted an 18 years old mango tree 16′-2″ high and 34″ in girth at the Ganeshkhind Botanical Gardens, Kirkee, in December 1931. The experiment was successfully carried out with the help of the requisite lifting tackle at a cost of Rs. 23 only and the tree is in a healthy condition now.

I have also executed the modification and test of the Power Chaff-cutter for S. C. D. and the erection of fencing at the New Wheat Breeding Station at Niphad.

Tractoring.

It was not possible to undertake any work on contract ploughing this year for want of funds but the two departmental machines, viz. the 15-30 McCormick Deering tractor in Khandesh and the 26-40 Model L Case tractor at Poona, were worked on ploughing Government lands at the

Bhadgaon Farm in Khandesh and at the New Sugarcane Research Station, Padegaon, district Satara. The results obtained are as under :—

	Area ploughed	Depth	Number of actual working days	Number of actual hours of work	Average time required per acre	Average cost per acre
	A. g.				H. m.	Rs. a. p.
(1) Padegaon Farm ..	71 26	10″–12″	23	198½	2 43	11 0 11
(2) Bhadgaon Farm ..	178 7	6″–7″	45	319	1 46	4 13 1

The conditions at Padegaon were very severe as land was wet due to rains and highly infested with deep Harialli weeds. The work at Bhadgaon was comparatively normal. The tractor in Khandesh is weakened at the main frame on account of failure of the weld on the main axle boss. Yet it did not show any sign of rupture or further development in the cracked portion. Replacement of the part is rather a costly affair, but, if undertaken, the tractor will give good service for a couple of years more. The New Model L Case tractor is found rather weak in the design of the wheels as one of them is slightly cracked at the boss, presumably on account of its latest tightening arrangement with only one key on a taper shaft. The wheel is repaired temporarily by shrinking a thick steel band on the boss.

The implements with the tractor in Khandesh are in good condition as they were little used but those with the Case tractor at Poona are much worn and require several replacements as they are working since 1921. Some of them are really worth a renewal when funds permit. The repairs are, however, taken in hand in order to work them until they are entirely replaced.

Drawings, Designs, Estimates and Surveys.

The drawing office was very busy this year, in making the detailed estimates and working drawings for the new Sugarcane Research Station, Padegaon, district Satara, the Wheat Breeding Station at Niphad, district Nasik, and the Cold Storage Scheme at Ganeshkhind Botanical Gardens, Kirkee, district Poona. Thus the total number of drawings produced amounts to 144, out of which 46 are big sized drawings and the remaining 98 are sketches. The number of estimates made out amounts to 33 out of which 20 pertain to Padegaon, and 7 for the New Cold Storage Scheme.

The number of sites surveyed amounts to 21, out of which 8 pertain to famine pumping. The particulars of 6 approved sites are given in a separate statement attached at the end.

Boring.

Considerable time had to be spent this year in connection with repairs to boring machines at the three centres and painting them afterwards in order to protect them from sun and rain. The number of machines actually repaired amounts to 28 in addition to 35 repaired previously. Thus the total number of machines repaired amounts to 63. Although the activities were closed, one of the 4" Musto Power Machines, which was already given on hire last year to an agriculturist in Khandesh on a daily hire of Rs. 2-8-0, exclusive of all other charges, was kept working nearly for 7 months. It made in all 8 bores in existing wells and bored an aggregate depth of 725'-6", tapped 22,800 gallons of water per hour and realised Rs. 752-8-0 including Rs. 115 for the last year's work.

It has been lately decided to work a few machines in the precarious areas of the South Central Division on revised conditions. It will not, however, be out of place to give below the amount of work the boring section has done since its commencement as the information will be found very useful and interesting :—

Number of bores made	2,841
Number of feet bored	215,839
Number of gallons of water tapped per hour ..	3,169,844

In addition to the sale of the two Musto Power machines last year, two more machines, viz. one Musto Power and one G-3 Calyx Rotary Drill, have been sold this year to the District Local Board, Satara, in addition to six hand machines transferred to the P. W. D. Central Stores and Workshops, Dapuri, and there is a possibility of selling one more Calyx Drill in the near future.

The position of the machines stocked at different depots is as under :—

Type of machine	Nadiad	Poona	Karajgi	Jalgaon	Total
Musto Power	4	8	5	1	18
Calyx Hand	1	..	..	..	1
Calyx Power	4	7	2	..	13
Armstrong	1	..	..	..	1
Exploratory hand machine	..	22	16	..	38
Cawnpore Power ..	1	..	..	..	1
	11	37	23	1	72

The total number of machines owned by the department previously amounted to 87, out of which 4 have been scrapped, 1 transferred to Sind and 6 to Dapuri and 4 have been sold, which leave a balance of only 72 machines as shown above.

The Soil Sampling machine was worked at the New Sugarcane Research Station, Padegaon, for taking out samples from the sub-soil strata to a maximum depth of 16′ in order to fix the cropping programme. The number of bores thus taken amounts to 77 aggregating a total footage of 356′-9″.

Research on Implements.

The implements for research on hand are the following, viz. :—The Seed Drill, the Winnower, the Groundnut Raiser and the Spear Grass Extractor and the work done on each is summarised as under.

Seed drill.—As recommended by the Crop Research Committee in 1931, three more improved drills were made in addition to the two in stock and same tried at 5 places, viz. :—Dharwar Farm, College Farm, Mohol Farm, Jalgaon Farm and Surat Farm on sufficiently large areas in order to find out the relative value of the drill in comparison with the country drill and also dibbling.

The germination tests with jowar at different places show that the Improved Drill has done well and even exceeded dibbling by nearly 4·49 per cent.

The calibration tests taken at different places show a distinct superiority of the Improved Seed Drill with the following results :—

Place	Length of row in feet	Dropping with					
		Country drill			Improved drill		
		1st coulter	2nd coulter	3rd coulter	1st coulter	2nd coulter	3rd coulter
(1) Surat Farm ..	175	310	195	..	350	370	..
(2) Dharwar Farm .	388	528	300	400	426	437	435·5
(3) College Farm ..	228	652	616	802	993	947	934

As regards the yield the following figures received from the Mohol Farm will be found very interesting :—

Type of drill.	Fodder per acre.	Grain per acre.
	Lbs.	Lbs.
Country drill	580	259
Improved drill	837	334

Thus the increase in grain and fodder with the Improved Drill amounts to 25 per cent. and 45 per cent. respectively over the country drill.

As regards the draft it must be admitted that it is much in excess over the country drill, which will be noticed from the following figures :—

Place of trial	Number of coulters	Depth of sowing	Weight of bullocks	Draft in lbs.		Weight in lbs.	
				Country drill	Improved drill	Country drill	Improved drill
			Lbs.				
Dharwar Farm ..	3	2″—2½″	1,800	100	170	48	385
Mohol Farm ..	3	2½″—3″	1,700	130	175	185	400
Jalgaon Farm ..	3	2″—2½″	1,700	141	186	107	400
College Farm ..	4	2″—3″	1,700	126	252	100	400
Surat Farm ..	2	2″—2½″	2,388	82	193	80	385

The principal reason for the excessive draft with the Improved drill is its enormous weight on account of the various contrivances. With a view to reduce the weight without sacrificing the general utility of the machine a lighter model has been built and tested at the shops with the result that the weight has come down to 350 lbs.; and the draft, without the covering blade to 140 lbs. Even then the draft is considered to be too much; and it has been decided to give the drill another trial at Dharwar and Mohol Farms with a view to decide on the safe figure of draft in relation to the weight of the animals and efforts in this direction are in progress.

The Winnower.—Last year trials with the Winnower revealed that the machine was found to be rather too heavy for one man to work continuously; and in order to obviate the difficulty, it was decided to introduce a chain drive in place of the belt. This naturally necessitated a good many changes and consequently the machine was not quite ready for trial in the harvesting season with the exception of the wheat season at Tagadi in Dholka taluka of Ahmedabad district. The results obtained there practically corroborate the results obtained in Khandesh last year. There is, however, no case for a Winnower for the Bhal tract, because, they get good wind during the season.

It has been, however, decided to give the Winnower an exhaustive test in Dharwar district where the winnowing operations on wheat have to be done quickly in order to escape ante-monsoon showers.

Groundnut Raiser.—The Howard's Rotary Potato Digger was tried on groundnut at Chikodi taluka of Belgaum district on Big Japan in Mal lands with considerable success. Out of its two rotary rakes, one was found to be superfluous for groundnuts and when it was removed the machine was found to be quite easy to pull for an average pair of bullocks with certain modifications. The cultivators appreciate the performance considerably. It can dig 2 acres of land, 3″ to 4″ deep per day and bring the pods and the creapers to the surface simultaneously at a cost of Re. 0-12-0 per acre against Rs. 1-8-0 for hand digging. The machine was tried on heavy black soil but was found to leave 10 per cent. of the pods in ground and require more draft than what a pair of bullocks can easily give.

Since the cultivators appreciated the work, it has been decided to build a lighter model at the shops with the necessary modifications and give it an exhaustive trial at Chikodi and other places in the next harvesting season.

The Spear Grass Extractor.—This machine has been further improved with a view to remedy the defects reported by the District Agricultural Overseer, Satara. It was sent to him again for trial in Karad taluka in December 1931. From the report recently received from him it may be noticed that the machine works quite satisfactorily and deals with an area of two to three acres a day with one man and one bullock only. The seat is, however, found to be slightly out of balance and when that is remedied the machine will be sent for further tests.

In addition to the above, the following works have been newly undertaken :—

(1) Design of Lime Juice Extractor,

(2) Design of Light Seed Drill.

Repairs and Tests.

The following is a brief account of the repairs and tests undertaken by the department during the year under report :—

(*i*) Repairs and overhaul to the Old Pumping Plant at the Ganeshkhind Gardens, Kirkee, including the diversion of its delivery pipe to the new discharge tank and the test of the flow which was found to be 178 gallons per minute ;

(*ii*) Testing of the capacity of the new plant at the above place with a meter and fixing the gauge glass with guard on the Hume Vent pipe ;

(*iii*) Repairs executed for the Agricultural College on the following :—

1. Pumping plant of the Septic Tank ;
2. Pressure gauge from the Mycological Section ;
3. Shanti drill from the College Farm ;
4. Fire Pump ;
5. Hot air engine from the laboratory ;
6. Erection of the Hot Water Boiler at the College Dairy including fixing of the chimney and gauge glass to the steam boiler.

(*iv*) Fixing of the pipe line at the Agricultural School, Loni ;

(*v*) Repairs to the pumping plant at Nangaon ;

(*vi*) Repairs to the plough from Modibag ;

(*vii*) Re-assembling of the Bruiser from Kopergaon, including minor repairs and despatch to Karajgi ;

(*viii*) Overhauling and testing of the 30 B.H.P. crude oil engine, 6 B.H.P. Hornsby engine and 7 B.H.P. Tangye engine together with a 3" Tangye pump ;

(*ix*) Overhauling and cleaning of the gas generating plant and the gas engine at the shops;

(*x*) Repairs to the engine and the bore-hole power pump at Bankapur Farm;

(*xi*) Repairs to 28 boring machines at three centres;

(*xii*) Repairs to pump at Dhulia Agricultural School, and to gins and tractor at Jalgaon Farm;

(*xiii*) Repairs to the Case tractor and its ploughs at Poona;

(*xiv*) Repairs to the two hand power force pumps and replacement of the wooden stair case at the Experimental Well, Poona, with a steel one.

Pumping.

The following works have been undertaken during the year on pumping.

(1) Erection of the new pumping plant at Sanjan for Mr. Karulkar with the assistance of the Mechanical Assistant, Gujarat.

(2) Loan of a small 4 B.H.P. pumping plant to the Public Works Department, including erection, running and dismantling, to pump out water from the basement of the Meteorological Observatory.

(3) Loan of a 4 B.H.P. pumping plant to the Mission School at Hadapsar for testing the capacity of the well.

(4) Loan of the bore-hole pump to Mr. Justice Bhide for testing the water supply.

(5) Dismantling the pumping plant at the Agricultural School Jambul, and removing same to Niphad for erection at the Wheat Breeding Station.

Miscellaneous.

The mechanical work of the North Central Division has been added to the activities of this Department from this year on account of the retrenchment of the Mechanical Assistant's post in that division.

The departmental receipts during the year amounted to Rs. 13,102-1-2 against Rs. 6,412-7-7 of last year, out of which Rs. 11,166-14-0 resulted from the sale of boring machines.

The inward and outward numbers amounted to 5,831 and 4,800 respectively.

The only important change in the establishment, besides the retrenchment of the staff, was the transfer of the Head Clerk Mr. Utagi to the Agriculturist Officer at the Sugarcane Research Station at Padegaon and the appointment of Mr. Limaye, Head Clerk to the Deputy Director of Agriculture, Nasik, in his place. Mr. Utagi has served the department for nearly 20 years and I must place on record my sense of warm appreciation of his meritorious and able services rendered to the department.

C. G. PARANJPE,
Assistant Agricultural Engineer
to Government, Bombay Presidency, Poona.

Statement showing particulars of Famine Pumping Sites

Serial No.	Serial number of site surveyed from the beginning	Name of village	Taluka	District	Name of river	Approximate total lift in feet
1	129	Dehu	Haveli	Poona	Indrayani	57·5
2	130	Kolawadi	Do.	Do.	Mula-Mutha	86·2
3	131	Pimpalgaon	Do.	Do.	Bhima	67·1
4	132	Kangaon	Dhond	Do.	Do.	73·9
5	133	Delawadi	Do.	Do.	Do.	56·2
6	134	Galganath	Havori	Dharwar	Vardha	45·1

Note.—Sites having a reasonable lift and requiring less piping and less initial outlay account of larger size of engine go under class II. Sites similar to class II but affected

(*in Bombay Presidency*) *approved during* 1931-32.

Area available in acres	Survey No.	Size of pump and power of engine required for full available area	Remarks
50	5	5" centrifugal pump and 16 BHP engine.	II class site.
100-200	19	6" pump, 45 BHP engine ..	Do.
200	177	7" pump, 45 BHP engine ..	III class, suitable for a portable unit.
150	126	6" pump and 34 BHP engine..	III class, suitable for a portable unit during famine only.
150	19 and 20	6" pump, 28 BHP engine ..	III class, useful for famine only.
100-150	50	6" pump and 24 BHP engine..	Do. do.

go under class I and those requiring long length of piping and greater initial outlay on by floods go under class III as they are unsuitable for fixtures and useful for famine only.

Programme of work under the Assistant to the Agricultural Engineer to Government, Bombay Presidency, for the year 1932-33.

(1) Experiments and modifications with implements including testing.	(*a*) Modifications and improvements on the Seed Drill, Groundnut Raiser, Norag Thresher, Spear Grass Extractor, Intercultural Implements and Winnower.
	(*b*) Experiments with water lifts and other agricultural machines.
	(*c*) Design of a new drill and a Lime Juice Extractor.
(2) Famine Pumping ..	(*a*) Inspection of pumping sites on large rivers for growing fodder.
	(*b*) Getting two more famine sets ready from the steam plough engines and keeping the 9 pumping sets (7 old and 2 new) ready for famine.
(3) Advice and practical help ..	(*a*) Training of cultivator students in engine driving.
	(*b*) Periodical inspection of agricultural machines in the Presidency.
	(*c*) General advice to inquiries on agricultural machinery.
	(*d*) Advice to Divisional Agricultural Officers in machinery.
	(*e*) Estimates, drawings, designs and site surveys.
(4) Higher Technical Assistance..	(*a*) Resource to Divisional Agricultural Institutions in case of breakdowns.
	(*b*) Erection of big plants and structures.
(5) Running of plants like the :—	(*a*) Workshops and experimental well.
	(*b*) Motor tractor in South Central Division and North Central Division.
(6) Boring ..	(*a*) Proper storage and care of the 72 boring machines stored at the 3 centres, viz., Poona, Nadiad and Karajgi.

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(b) Technical advice to South Central Division in case a few machines are worked according to the new scheme in precarious areas.

(7) Special work

(a) Special work in connection with the water measuring experiments, buildings and laboratories for the New Sugarcane Research Station, Padegaon, including laying of 10" and 6" Hume Pipe lines with 30 reinforced concrete sinks fitted with specially designed outlets.

(b) Mechanical assistance in North Central Division and Konkan Division.

(c) Erection of a pumping plant at the Wheat Breeding Station, Niphad, together with fencing.

(8) General .. (a) Routine departmental work pertaining to office, workshops and experimental well, divisions, Padegaon Research Station and Boring.

(b) Charge of Nangaon Pumping Plant, Karajgi, Power Baling Plant, boring machines and Steam Plough.

C. G. PARANJPE,

Assistant Agricultural Engineer
to Government, Bombay Presidency, Poona.

APPENDIX P.

Summary of Work done under the Horticulturist to Government, Bombay Presidency Poona, during the year 1931-32.

Staff.—Dr. G. S. Cheema worked as Empire Marketing Board Scholar from India for the year 1931. During his absence in England, Mr. H. P. Paranjpye, held charge of the section, Mr. P. G. Dani officiating as the District Horticultural Officer from 30th May 1931 to 25th November 1931. The post of the District Horticultural Officer and that of one Graduate Assistant have been retrenched from this Section from 1st March 1932. But one Graduate Assistant and one Non-Graduate Assistant have been allotted to this section for extension work in the Konkan. Mr. S. R. Gandhi has returned from Sind to take charge of the post of the Demonstrator in Horticulture. Mr. S. M. Patel is a new addition to our staff, and is succeeded by Mr. I. A. Sayed as Graduate Assistant for Vegetable Work, financed by the Sir Sassoon David Trust Fund.

Financial Position.—The financial situation of the two gardens attached to this section, namely, the Ganeshkhind Botanical Gardens, Kirkee, and the Modibag, has materially improved in spite of the trade depression and the retrenchment cuts in their budgets. This is due to the change in the system of working and management of these gardens. It is expected that they will pay back their cultivation charges in the near future.

Laboratory Work.—The preservation of lime juice along with Jambhul juice is yet a problem with us. Lime juice is now being charged with various strengths of Sulphur dioxide and preserved with sugar to see if a desirable marketable product can be obtained. The preservation of the colour of Jambhul juice has not met with great success. Our efforts are being concentrated to design a lemon juice press which can be used in villages.

Horticultural Teaching.—Horticultural teaching has become very popular during the last few years among the students of the Poona College of Agriculture as well as outsiders. There are this year 16 students in the College for advanced Horticultural Course. This is the largest number among the Optional Groups. The Practical Horticultural Course at the Ganeshkhind Garden is similarly popular. This year this course has attracted 11 students which is a record number. Besides this, the Hyderabad State has deputed to our section their Specialist to undergo Horticultural training.

Departmental Examination in Accounts.—The first Departmental Examination in accounts was held in April last. Mr. S. S. Bhat, M.Ag., of this Section has come out successful in it, standing First in Class First.

Publications.—The following publications were published during the year under report :—

1. Commercial Cultivation of Grafted Mangoes—(Kalmi Ambyache Vyaparee Lagvad) in Marathi by P. G. Joshi.
2. Selection of site for an orange orchard—Leaflet No. 5 of 1931.
3. Cultivation of papaya—Leaflet No. 1 of 1932.

Export of mangoes to Europe.—It is now definitely worked out that the mango is the richest fruit in Vitamin C. It is fairly rich in Vitamin A also. It is chiefly on the basis of this study, that the export work on a large scale was undertaken this year. This work was accelerated by the grant of Rs. 4,500 placed at our disposal by the Imperial Council of Agricultural Research, New Delhi. Most of the mango fruits reached England in good condition and were sold at the rate of 1 to 2 shillings each. The public in India as well as in England have evinced a great deal of interest in this work and it can be definitely stated that this industry will be developed within a few years. The mango growers as well as dealers of this Presidency will be greatly benefited.

Extension of cashewnut cultivation.—The use of varkas lands for planting cashewnut trees is being investigated at the instance of the Government of Bombay. This is a work of very great economic importance. It is hoped that it will be brought to a successful end in the near future.

Marketing studies.—This work is completed and a report has been submitted to the Government. It has been worked out that the present system of marketing requires a good deal of change before fruit and vegetable growers can hope to reap the benefit of their labours. If the recommendations made in the report would be adopted by the Government a great deal of development is bound to follow.

Ganeshkhind Botanical Gardens, Kirkee.

Considerable attention is being paid to the remodelling work. Most of the plots have been already levelled and planted with the chief fruit crops of Western India. These plantations will afford us a great opportunity to work out the economics of fruit farming.

Mangoes.—A plot has been opened where manurial trials are laid out for future observations. Six different combinations of manures are under trial. The comparative value of Farm Yard Manure, Sulphate of Ammonia, Bone-meal, Niciphos, Caster Cake and Fish etc., is being worked out.

Jambhul.—The grafted jambhul trees have not come to bearing as yet. Now they are 8 years old.

Foreign Figs.—The Dotato (Italian white) fig has borne some good fruits this time. The plants have not yet acclimatised. All the varieties are under careful observations and the tests are continued.

Guava.—The selected strains are bearing satisfactorily. Strains Nos. 46 and 49 Lucknow are decidedly the best in our collection. Their economic value is being worked out for the information of the public.

Pomegranate.—There are now in hand a few strains of pomegranates with soft seeds. The yield of these strains is being recorded.

Bananas.—Suckers of seedling bananas are carried over to the new plantations. It is yet to be seen whether further cultivation brings about any change in the quality of the fruits of these seedlings.

The Basrai banana has given good satisfaction in the Deccan conditions. The distribution of suckers of this variety is being pushed ahead. It is expected that a large area will be planted with this variety in the near future. This fruit is getting popular in the market. The plants being dwarf the variety is very suitable for windy localities.

Grape vines.—An extensive plantation of grape vines of the Bhokri variety is raised this year to work out its commercial possibilities in this tract.

Improvement of Vegetables.—It is unfortunate that the first chilli crop proved a failure due to a serious attack of the Mosaic disease. Duplicate plots are being laid out this year as a precautionary measure. Seed beds are rabbed and all necessary measures for saving the crop during the ensuing year are being taken. Although the crop was damaged, successful efforts were made to preserve seeds of different strains for further work.

The brinjal crop was a great success, although some damage was caused by root nematodes. A good quantity of selfed seeds has been collected. A large number of strains will be tested during the ensuing year. So far, the Surat round variety is leading in these selections.

Pomological Museum.—This museum is a great attraction to all the visitors. It affords a detailed study of the fruit industry of this Presidency to the University students of the Poona Agricultural College. The museum is being enriched every year.

Modibag.

Most of the routine work of this garden like that of the Ganeshkhind Botanical Gardens, is being changed to suit the present conditions of the fruit industry of this Presidency. The chief investigational work taken in hand this year on a large scale deals with problems such as the alternate bearing of mango, citrus, and mango stocks, propagation of mango by budding, and introduction of new crops like grape fruits, navel oranges, and strawberries.

Alternate bearing of mangoes.—This work is progressing on the following lines :—

(1) Double grafting of plants.

(2) Pruning.

(3) Heavy manuring coupled with regular irrigation.

The study of the fruit spur shows that it takes 8 to 10 months to mature.

Citrus stocks.—The relation of the growth of root of the stock to the growth of its shoot as well as that of the growth of scion is being worked out. The root studies are being made in observation boxes with glass pans on one side. A plot is opened to make further observations on the influence of stock on scion and vice versa. A regular scheme has been proposed to carry out this work on a large scale. The relation of growth between the stock and the scion, the productivity of stock and its influence on the scion are the important phases on which observations will be recorded.

Mango Stocks.—It is observed that seedlings grown from one and the same parent show wide individual variations, at the same time differing widely from the parent plants. These seedlings will be top-worked with the Alphonso and their influence on the scion will be recorded.

Mango Budding.—The selection of scion and the season of budding are the two most important factors that are largely responsible for the success of mango budding. A fairly good percentage of success can be obtained, if non-petioled buds are secured from branches of 4 to 5 seasons growth and the operation is done during the months of August and September.

Irrigation Experiments in Banana.—Trench system of irrigation has been compared with the bed system which is the common rayat's method. It is observed that trench system is superior to the bed system in every respect.

Grape Vine Seedlings.—Two Pandhari Sahebi seedlings have been noted as promising, being better in quality than Bhokari. Further trial will be continued to find out if they can be profitably brought under cultivation.

New Introductions.—The navel orange plants have yielded quite satisfactory results. It remains to be seen whether cultivators take to this variety. The grape fruit is also under trial.

Strawberry.—Strawberry suckers have taken roots nicely and borne some fruits also. The economic value of this fruit in the Deccan plains is being worked out.

Advisory Work.

Enquiries from the public during the year under report numbered 897 which shows the keen interest they are taking in developing fruit plantations. The increase in the acreage of fruit trees is also satisfactory reaching a figure of 57,662 acres against 53,186 in the previous years.

Conclusion.

Before concluding, it may be mentioned here that the work of this section has been brought in line with the recommendations of the Royal Commission on Agriculture in India. This work is expected to progress most satisfactorily if not hampered by further retrenchment.

Programme of work under the Horticulturist to Government, Poona, for the year 1932-33.

(1) Lemon and Jambul juice preservation.

(2) Export of mango to Europe.

(3) The Economics of Cashew cultivation.

(4) Improvement in the system of Marketting.

(5) Remodelling of the Ganeshkhind Botanical Gardens.

(6) Manurial observations on mango, fig and pomegranate.

(7) Alternate bearing of mango.

(8) The testing of Guava, Pomegranate, Grape and Fig selections.

(9) Mango and Citrus stock experiments.

(10) Improvement of Brinjal and Chilli.

(11) Introduction of new fruits, such as Grape fruit, Navel orange, Strawberry, Italian lemon in the Deccan.

(12) Nursery improvements such as, budding of mango, Guava and Jambul stocks.

APPENDIX Q.

Summary of Work done under the Inspector of Agricultural Schools, Bombay Presidency, Poona, for the year 1931-32.

Staff.—Professor V. G. Gokhale was in charge of this post from 1st July 1931 to 16th September 1931 in addition to his own duties as the Professor of Agriculture, Agricultural College, Poona. From the 16th September 1931 onwards, I held the charge of the Inspector of Agricultural Schools, Bombay Presidency, Poona. Mr. R. K. Torgal continued to work as a clerk in this office almost throughout the year. As he was a temporary hand, he was asked to go home on the 9th April 1932, as an effect of retrenchment. From the date of his liberation, Mr. D. K. Shirasath, a permanent hand was transferred to this office from the office of the Director of Agriculture, Bombay Presidency, Poona.

Change of head-quarters.—From 1st July 1931, to the 16th September 1931, as this post was held by the professor of Agriculture, this office was shifted to the office of the Professor of Agriculture. in the Agricultural College, Poona. From 16th September 1931 to 1st December 1931, the head-quarters of this office were temporarily located at Devihosur, Dharwar District, in order to train the new Head Master of the S. M. K. Agricultural School at Devihosur to handle his duties more efficiently and effectively. From 1st December 1931, the head-quarters of this office were re-transferred to Poona from Devihosur, when the training work was over.

Nature of work.—The nature of my work was mainly advisory in connection with the Vernacular Agricultural Schools and those 1st grade Primary Schools, where Agricultural Bias Classes are introduced. Then comes the inspection work of the two sorts of schools. During the inspection, some model lessons were given to the boys so as to show the teachers how the instructions should be given and which of the portion should be emphasised and carefully attended to. Third is the examination work of these two kinds of schools, which I managed with the assistance of the district staff as co-examiners in the case of the Vernacular Agricultural Schools, and as the main examiners in the case of the Agricultural Bias Classes. In addition to these, I had to examine the boys of the Government Rural Training School at Narayangaon in Poona District and those of the Shikshan Prasarak Mandali's Vernacular Agricultural School at Rajapur in the Ratnagiri District. Last but the least is the corresponding work. Nature of correspondence cannot be described. But I had to deal with Agricultural Department, Educational Department, Local Self Governments, Public Works Department and private bodies in the Presidency proper including the Indian States.

Vernacular Agricultural Schools.

Owing to the financial strigency, the Government have temporarily closed the Vernacular Agricultural Schools at Surat, Godhra and Jambul from 1st April 1931 and that of Loni from 1st March 1932. Now the Vernacular Agricultural Schools at Devihosur, District Dharwar and at

Dhulia are the only schools, which are imparting the vocational education in agriculture to the sons of genuine cultivators. After abolishing the Vernacular Agricultural School at Jambul in the Konkan, some attempts are made to give agricultural education to the sons of the cultivators by some private bodies. At Bordi in the Thana District, there is a High School run by the Gokhale Educational Society. In this High School, arrangements are made to teach agriculture also to the boys of the first three standards, in addition to other subjects. Similarly arrangements are made to teach agriculture in the High School at Rajapur, District Ratnagiri. In addition to the boys of the I, II and III standards, some more students are admitted here entirely for the vocational course.

On account of the financial stringency, a new scheme of earning while learning has not been taken up as yet. This scheme is intended to enable the Local Bodies to undertake the work of imparting Agricultural Education to the cultivators' sons with the limited help from Government.

There has been a great rush in the number of application for admission both in the S. M. K. Agricultural School at Devihosur and the Vernacular Agricultural School at Dhulia. But only a limited number of students are admitted in each school, after a careful selection. So, many students are refused admission for want of accommodation. Formerly, the whole boarding expenditure of the boys was met by the Government. Then scholarship system was introduced. Each student was given the scholarship of Rs. 10 per month. It was then reduced to Rs. 8 per month. During this year each student was given the scholarship of Rs. 5 per month. Moreover, attempts have been made at Devihosur and are being made even at Dhulia to admit student without scholarships. Hence there is a great demand for this kind of education, which has been considered as the right sort of vocational education in the rural area.

The Educational Inspector at Ramdurg is thinking of starting a new Vernacular Agricultural School in one of the villages in the Ramdurg State. Necessary information has been already supplied to him to do the needful. The Vocational Agricultural School at Ankleshwar in the Broach District, the Agricultural School at Manmad in the Nasik District and the Agricultural School at Jabbulpore, which are run by some private mission societies, have been helped to a great extent by giving some useful and timely information and advice.

Curriculum.—It remained practically the same, but more time is devoted to the practical field work. Besides, minor industries, such as Carpentry, Smithy, Weaving and Rope-making have been now more and more developed in all schools. The curriculum and the method of teaching may need radical change if the scheme of earning while learning is effected.

The work of different Agricultural Schools.

Loni School.—This is the premier school in the Presidency. During the year under report there was only one class. New students were not admitted at all. But two new teachers, deputed for the Agricultural training from the Ahmednagar and Nasik Districts were trained here along

with the 2nd year students. Mr. Khot was the Head Master throughout the year. Soon after the Annual Examination was over, in the last week of February 1932, the school was closed from 1st March 1932. During these 22 years, 361 students and 51 teachers have been trained.

Devihosur School.—This is the 2nd of the Agricultural Schools opened in the Bombay Presidency. This school has been doing very good work and a greater number of boys, passed out of this school, have been doing good work on their own lands. This school has thus become very popular. Hundreds of applications are received every year. But only a few are admitted. The boys are prepared to get the education here even without scholarship. The farm and minor industry work has been greatly developed here. Mr. V. C. Pavate was the Head Master up to the 5th November 1931. Mr. T. N. Chaugule succeeded him. During these 18 years, 231 students and 39 teachers were trained successfully.

Dhulia School.—This is a Semi-Government institution. The expenses on account of the boarding of the students are met with the subscription from the local bodies such as District Local Boards, Taluka Local Boards, Taluka Development Associations, etc. Here also the reduced scholarship is brought into force. Mr. S. S. Surve, the Head Master, is efficiently managing both the School and the school farm. During these 9 years, 103 students are successfully turned out. As the Loni school has been abolished, there is a great demand to this school from all districts, knowing Marathi.

Inspection and Examination.—Though my appointment was made in the month of September 1931, I was not allowed to tour as I was also in charge of the S. M. K. Agricultural School. So, I had to be out for 128 days out of 238 days. In this short period I visited and inspected almost all the Agricultural Bias Classes. As regards the Vernacular Agricultural Schools, I had to pay the examination visits in addition to the inspection ones. The results of the Annual Examinations conducted with the help of the District staff are as follows :—

Name of the School.	No. of the boys appeared.			No. of the boys passed.			Remarks.
	I Year.	II Year.	Teachers.	I Year.	II Year.	Teachers.	
1	2	3	4	5	6	7	8
Loni ..	..	20	2	..	20	2	
Devihosur* ..	15	18	1	13	16	1	*Two boys promoted to the 2nd year.
Dhulia ..	15	17	..	15	17	..	

All the schools have done well. But the degree of success is more or less depends upon the sincerity, efficiency and tactfulness of the Head Master.

Past students of V. A. Schools.—Past students of the Vernacular Agricultural Schools have been spread in the nooks and corners of the Bombay Presidency. Many students in the Karnatak are doing

excellent work and have improved their status from the financial point of view. The following information which has been collected about the past students of the Vernacular Agricultural Schools in the Bombay Presidency, may not be out of place :—

Name of the School.	Number of the boys trained up till now.	Number of the boys actually working on their farms.	Number of the boys whose history sheets are received.	Number of the boys of whom nothing is known.	Number of the boys who are engaged somewhere else.
1	2	3	4	5	6
Devihosur School	231	124	45	44	63
Dhulia School	103	27	..	17	59
Loni School	361	72	44	250	39
Jambul School	108	19	19	..	..
Godhra School	108	21	21	..	79
Surat School	84	Information not received.			

Agricultural Bias Classes.

The Vernacular Agricultural Schools and the Agricultural Bias Classes *are not* one and the same as many people misunderstand one for the other. Vernacular Agricultural Schools are independent Vocational Schools, where education is given *in Agriculture* and the Agricultural Bias Classes are those introduced in the 1st Grade Primary Schools and these are pre-vocational ones, where education is given *for Agriculture*. There are 72 schools where the Agricultural Bias Classes have been introduced in the Bombay Presidency excluding Sind and the details of the same are as follows :—

STATEMENT "A".

Serial No.	Name of District.	Number of schools.	Number of boys who have passed Vernacular Final.	Number of boys doing Agriculture.	Number of boys doing other work.	Number of boys in VII Standard.	Number of boys in VI Standard.	Number of boys in V Standard.	Total number of boys receiving agricultural education in A. B. Classes.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
	Karnatak Southern Division.									
1	Belgaum ..	13	87	136*	126*	154	101	139	394	*Plucked students are included.
2	Dharwar ..	5	44	31	13	16	40	61	117	
3	Bijapur ..	5	57	20	37	47	81	57	135	
4	Karwar ..	2	11	4	7	13	16	23	52	
	Total ..	25	199	191	183	230	138	280	698	

STATEMENT "A"—*contd.*

Serial No.	Name of District.	Number of schools.	Number of boys who have passed Vernacular Final.	Number of boys doing Agriculture.	Number of boys doing other work.	Number of boys in VII Standard.	Number of boys in VI Standard.	Number of boys in V Standard.	Total number of boys receiving agricultural education in A. B. Classes.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
	Central Division.									
5	Poona ..	3	59	42	17	44	37	46	127	
6	Satara ..	4	121	72	49	77	63	92	232	
7	Ahmednagar ..	6	105	67	38	78	58	93	229	
8	Sholapur ..	6	54	27	27	41	57	76	174	
9	East Khandesh.	6	134	77	57	106	105	181	392	
10	West Khandesh.	2	20	11	9	39	33	36	108	
	Total ..	27	493	296	197	381	349	524	1,262	
	Konkan Bombay Division.									
11	Nasik ..	5	59	36	23	72	65	71	208	
12	Thana ..	1	9	30	9	11	15	13	39	
13	Ratnagiri ..	2	38	8	30	25	25	52	102	
	Total ..	8	106	74	62	108	105		349	
	Gujarat Division.									
14	Surat ..	3	76	51	25	37	38	41	116	
15	Broach ..	2	14	10	4	24	30	49	103	
16	Godhra ..	4	70	68	2	38	47	50	135	
17	Kaira ..	2	57	74*	13	20	24	28	72	*Plucked students are included.
18	Ahmedabad ..	1	11	7	4	14	4	15	33	
	Total ..	12	228	210	48	133	143	183	459	
	Grand Total ..	72†	1,026	771	490	852	785	1,123	2,768	

†There are four more A. B. Classes, which are managed by the Christian Mission Societies. They are at Ankaleshwar, Manmad, Vadala and Baramati.

From the statement it is clear that more than three-fourth of the boys, undergone the Agricultural training in the Agricultural Bias Classes are doing Agriculture on improved lines to some extent. But it is the general experience that those who have passed their ordinary Vernacular Final Examination will not take up Agriculture, though they do not get any service and though their parents are actually working in Agriculture. So, it is said now every where that the Agricultural Bias Classes are the proper schools, where the right sort of education is

imparted to the sons of genuine cultivators. Hence, there is more demand for the same. But owing to the extreme financial stringency, both on the part of the Government and on the part of the Local Authorities, it has become very difficult to extend these classes, though there is room for opening 50 more classes as that number of trained teachers is available.

In the course of my touring of the last 8 months, I was able to visit all the Agricultural Bias Classes in different divisions once. The progress of the Agricultural Bias Classes on the whole is satisfactory. However, some necessary instructions were given to all the Agricultural Bias Class Masters, so as to enable them to run their classes still more systematically and effectively. Arrangements are made to follow the syllabus so as to maintain the uniformity in each school in teaching all the technical subjects and in getting articles prepared in workshop and weaving.

All the Agricultural Bias Classes have got their own farms. Generally the school-farm is divided into two plots, one for the demonstration and the other for the observation. The yield realised on the former goes to the School Boards and that on the latter is usually given to the pupils as a sort of remuneration for their real work. Farmers in villages thus, get an opportunity of seeing the good work of students, undergoing training and are led to realise literacy " As a bare requirement of rural respectability ".

Training of teachers.—Training of the Agricultural Bias Class Teachers is most important and every kind of care is being taken in doing the needful to popularise the movement.

During the year under report, two teachers at Loni and one teacher at Devihosur have received training in Agriculture. As there was no arrangement to train them in weaving at Loni, the teachers, soon after their examination was over at the close of February 1932, were sent to Dhulia Agricultural School and trained in weaving for one month. The following statement gives definite information as to how many teachers were trained in each division and how many teachers are employed :—

Serial No.	Name of the School where the teachers are trained.	Number of teachers trained up till now.	Number of teachers engaged in the A. B. Classes.	Number of teachers not employed in the A. B. Classes.	Remarks.
1	2	3	4	5	6
1	Devihosur	39	23+1*	15	*One is working in the V. A. School, Devihosur.
2	Dhulia	..	..	..	
3	Loni	51	37	27	
4	Jambul	13			Two are employed in the Karnatak.
5	Godhra	20	12	8	
6	Surat	..	..	..	
	Total ..	123	72+1	50	

As the Vernacular Agricultural Schools at Loni, Godhra and Jambul have been abolished, new some special arrangements may be soon made in each division to train the teachers for the Agricultural Bias Classes. The Government Rural Training School at Narayangaon is turning out suitable teachers familiar with rural life. Mostly the boys, who have passed their Vernacular Final Examination with the Agricultural course, are admitted in this training school. However, the teachers, trained here may not suit the requirements of the Agricultural Bias Classes independently. But they may be useful to serve as assistants in the Agricultural Bias Class Schools. It seems, therefore, desirable to have more of such schools and it is also necessary to have an advanced Agricultural course taught there. Then and then only they will be the proper men to be appointed for the Agricultural Bias Class Schools.

There is a genetal complaint that there are no text books for the Agricultural Bias Classes. Yes, some books are available in Marathi but no books are available either in Gujarati or in Kanarese. So, special arrangements may soon be made by the Educational Department.

V. C. PAVATE,

Inspector of Agricultural Schools,

Poona, 18th July 1932. Bombay Presidency, Poona.

Programme of Work under the Inspector of Agricultural Schools, Poona, for the year 1932-33.

(1) Continuation of the inspection and the examination as well as advice to the controlling officers in regarding the Vernacular Agricultural Schools and the Agricultural Bias Classes.

(2) Taking of further steps in establishment of Vernacular Agricultural School on the line of "Earning while Learning" as an experimental measure if the Government desire.

(3) Organisation of and guidance to the Associations of the past students of the Vernacular Agricultural Schools and rural clubs for the boys of the Agricultural Bias Classes.

(4) Organising training classes and conferences for the Agricultural Teachers and the Supervisors.

(5) Advising the District School Boards as regards the opening of new Agricultural Classes whenever needed.

(6) Attempts to write some books in Kanarese, Gujarati, etc., so as to fill up the gap of the scarcity of books for the use of the Agricultural Bias Classes.

V. C. PAVATE,
Inspector of Agricultural Schools,
Bombay Presidency, Poona.

Poona, 18th July 1932.

APPENDIX R.

Summary of Work done by the Professor of Agricultural Economics during the year 1931-32.

I continued as Professor of Agricultural Economics throughout the year. In addition to my duties as Professor of Agricultural Economics I am acting as Principal of the College from 30th April 1932.

Mr. T. G. Shirname, B.Ag., Demonstrator in Agricultural Economics, has been on study leave in England. Mr. K. M. Shah, B.Ag., acted in place of Mr. Shirname. Mr. T. B. Pawar, B.Ag., Graduate Assistant, continued the Farm Cost Studies at Malsiras in Sholapur District.

(1) Teaching.

Agricultural Economics is taught in the junior B.Ag. and senior B.Ag. classes as a compulsory course and also to the students in the senior B.Ag. class who take advanced Agricultural Economics as their optional subject. There were 60 students in the junior B.Ag., 87 in the senior B.Ag. and 23 (including one Diploma) in the optional group of Advanced Agricultural Economics. As Compulsory Agricultural Economics goes with Agriculture for examination purposes the result of Agricultural Economics for compulsory course cannot be given separately. Twenty-four students (22 fresh and 2 old) from Agricultural Economics optional appeared for the B.Ag. examination, of whom seventeen passed in all subjects and obtained their degrees. Out of the seven unsuccessful students three got exemption in Agricultural Economics. The Diploma student also came out successful. Two B.Ags. have continued their M.Ag. study in my section.

(2) Research.

The research work for the last five years was compiled and submitted for publication: (1) Book on "Principles and Practice of Farm Costing with Farm Studies" and (2) Bulletin No. 168 of 1932 on "Preliminary Studies of Important Crops in the Bombay Deccan in the Post-War period". Since the works are in press, I do not propose to detail any important points in the studies.

The study of 25 farms covering an area of about 600 acres at and near Malsiras in Sholapur District has been continued. This work was commenced in April 1930 and there is a volume of data collected. The data for the year 1930-31 is collated and that for the year 1931-32 is being worked out. The work will be continued for another year (1932-33) before it is put up as a bulletin.

(3) General Observations.

Since I would be retiring this will be the last report of mine as Professor of Agricultural Economics. A few general observations on the working of the Section will not, therefore, be out of place. The need of Agricultural Economics in the College of Agriculture and in the Department was

long-felt and Mr. Keatinge, ex-Director of Agriculture, and Dr. Mann, ex-Principal of the College of Agriculture, in their spare time wrote two books each, on some phases of the subject. When Mr. Keatinge retired and while Dr. Mann was on leave the University of Bombay proposed to introduce the subject of Agricultural Economics in the curriculum of Agriculture; Mr. Main (the then Acting Director of Agriculture) took up the matter seriously and made proposals to create a chair of Agricultural Economics. His idea was to treat the occupant of the chair as (i) a Professor to teach Agricultural Economics at the College and (ii) as an Agricultural Economist to the Government of Bombay especially as an Agricultural Statistician to help the Director of Agriculture. Before the proposals were sanctioned Dr. Mann returned and he unfortunately did not approve of the proposals in their entirety and confined the activities of the Professor of Agricultural Economics to the teaching at the College. As a result, the section has remained more as a teaching section and was only allowed to continue the costing of farms in the district.

The introduction of Agricultural Economics in the curriculum has been found very useful in rounding up Agricultural education. From 1926-27 to 1931-32 the students taking Agricultural Economics steadily grew well as will be seen from the figures given in the margin. For the year 1932-33 (though this year does not find place in the report) the number of students dropped to 6. This is due to the fact that I was to have retired in June last and that the nomination of my successor had not been announced. The popularity of the subject with the student world and the appreciation of the subject by the public and the Agricultural officers connected with the Department of Agriculture is borne out by the fact that the Board of Studies in Agriculture of the University of Bombay, has, in the new syllabus, proposed to treat Agricultural Economics as a separate subject in the curriculum of Agricultural Studies.

1926-27	9
1927-28	8
1928-29	7
1929-30	15
1930-31	18
1931-32	23

As a section of the Department, however, it has neither attracted the attention of the public nor of the Department of Agriculture. The reasons are obvious. In the first place Government did not expect the section to handle agricultural statistics and draw inferences therefrom for moulding the departmental policy towards crops and cropping, etc. In the second place the section, unlike sections rendering direct services to the agricultural public as analysing manures and food-stuffs, checking plant pests, supplying improved seeds, etc., cannot offer direct services. The Agricultural Economist can with the inductive and deductive methods, foretell the trends of prices and their effect upon the enterprizes of the farmer and make suggestions regarding the advisibility of increasing certain crops and decreasing others or improving cropping plans and marketing of farm products.

Economics is the Science of the generalizations about human activities. These generalizations are implicit in their interactions of supply and demand. For basing his inferences about the future trends, Agricultura

Economist has to organize and interpret the facts about the past and the present happenings. Though Agricultural Economist dealing in abstract science, cannot foretell what is exactly going to happen yet his inferences generally come out nearly true. They cannot be as true as in exact sciences like mathematics or chemistry. When it falls to the lot of an Economist to say something which savours unpleasant for the future he often has to stand immediate ridicule from the men who only look to the present, though at times he gets the ear of such men when he prophecies better opportunities in the future.

In the years, 1922-23 when prices of *gul* were high and the area of sugarcane was rising due to the impetus of War prices I had, in several Irrigation Conferences, expressed my fear of the falling prices of *gul* and the natural result on the acreage of sugarcane. Instead of giving some weight to the inferences and suggestion, I was shown the then rising curve of the cane area, while in 1922-23 I could not draw the falling curve of the falling prices of *gul* and of the area under sugarcane which took place in recent years which will be clear from the following figures.

Acreage of sugarcane on the important canals in the Deccan, 1921-22 *to* 1930-31.

Name of the Canal	1921-22	1922-23	1923-24	1924-25	1925-26
Nira Left Bank ..	6,322	6,922	7,163	6,775	7,968
Godavari Right Bank ..	3,348	4,428	4,444	4,034	4,139
Godavari Left Bank ..	2,703	3,191	3,151	3,108	2,710
Pravara Right Bank ..	162	325	1,026	2,070	2,104
Total ..	12,535	14,866	15,784	15,987	16,921

Name of the Canal	1926-27	1927-28	1928-29	1929-30	1930-31
Nira Left Bank ..	9,642	9,341	7,864	7,098	6,023
Godavari Right Bank ..	3,675	4,133	3,265	2,560	2,322
Godavari Left Bank ..	2,389	2,791	2,253	1,925	1,987
Pravara Right Bank ..	2,108	2,357	1,039	791	709
Total ..	17,814	18,622	14,421	12,374	11,041

Index numbers of wholesale prices of Gul.

Year.	1914	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
Index No.	100	183	188	145	152	159	125	115	123	139	117	88

I cannot get back the audience of 1922-23 to tell them that I was not wrong in my inferences. I, however, refer to this incident to bring out the importance of the use of statistical study and its analysis.

As early as 1922 I had expressed my fear of the encroachment of cotton on the food and fodder crops, and in the year 1930 I actually proposed the subject of "the maladjustment of food and non-food crops in the Khandesh District" for discussion in the Crop Research Committee. While cotton is produced and consumed in large number of countries, *bajri* and *jowar* are grown and consumed only in India and naturally prices of these crops do not undergo violent ups and downs as in the case of cotton and sugarcane.

I do not mean that we could have kept up the prices of *gul* and cotton by compelling the farmers to cut down the areas under these crops. We could, however, have done our duty in suggesting to the cultivators and the Irrigation Department to partly forestall the catastrophe, which has overtaken cotton and sugarcane, by cutting down the areas slowly and discouraging sugarcane by announcing and following more suitable Irrigation policy. Economic forces are compelling the farmers to reduce cane and cotton areas and adjustment is coming per force. Such adjustment, however, comes at a great cost.

I only cited these cases with a view to bringing to the notice of the Agricultural Department the value and need of developing economic research and to making use of the same to avoid (at any rate minimise) losses of and to point out opportunities to the farmers. I think there is plenty of work in Agricultural Economics if the section is developed and made use of, it ought to render very useful service to Agriculture and Agriculturists.

P. C. PATIL,
Professor of Agricultural Economics.

College of Agriculture, Poona,
8th July 1932.

Programme of work under the Professor of Agricultural Economics, Poona, for the year 1932-33.

In addition to the teaching work at the College the work of costing the 25 farms at and near Malsiras in the Sholapur District will be continued. The field work of these farms will be over by about February 1933. The collation of the three years' study and the writing of it is on hand and it is hoped that it will be finished during the course of the year (1932-33).

It may be necessary between March and April 1933 to select a new tract for study for the years 1933 to 1936.

The revision of Bulletin No. 109 of 1921 will be taken up if time is available.

A 6-week course in the Principles and Practice of crops and farms costing is contemplated at Malsiras in July and August 1932. About 40 applications (including ten from Madras) of graduates in Agriculture have been received. It is proposed to take 25 graduates from the Presidency and 5 from outside. Along with cost study about 30 lectures on Agricultural Economics, Co-operation, present situation of agriculture especially of sugarcane and cotton, etc., have been arranged. It is expected that some of these men may be absorbed in the new scheme of Investigation into the cost of production of important crops launched by the Agricultural Research Council of the Government of India. Such a class will, it is hoped, be very useful as a refresher class to the old graduates in and outside the different services.

P. C. PATIL,

Professor of Agricultural Economics.

College of Agriculture, Poona,
8th July 1932.

List of Agricultural Bulletins published by the Department of Agriculture and kept for Sale at the Government Book Depot, Bombay.

No.	Year.	*Subject.*	Price. Rs.	a.	p.
32	1908	Locusts in India, by H. M. Lefroy, Imperial Entomologist, Pusa.	0	8	0
33	1909	Cultivation of Broach Cotton in Dharwar, by M. L. Kulkarni, Divisional Inspector of Agriculture, S. D.	0	4	0
34	1909	Night-soil—A Valuable Manure, by G. K. Kelkar, Assistant Professor of Agriculture, Agricultural College, Poona ...	0	4	0
36	1910	First Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency, by W. Burns, Economic Botanist ...	0	14	0
37	1910	An Examination of the Seed-Supply of the Broach District, by G. D. Mehta	0	4	0
39	1910	The Salt Lands of the Nira Valley, by Harold H. Mann, Principal, Agricultural College, Poona, and V. A. Tamhane, Laboratory Assistant, Agricultural College, Poona	0	5	0
40	1911	The Cultivation of Guavas near Poona, Dharwar and Limbgaon .	0	12	0
41	1911	Groundnuts in the Bombay Deccan	0	4	0
43	1911	An Examination of the Seed-Supply of the Broach District, Part II	0	5	0
44	1911	Preliminary Study of the Red Rot of Sugarcane in the Bombay Presidency	0	8	0
45	1911	Second Year's Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency	0	14	0
46	1911	Seed Selections Series I, Broach Cotton	0	8	0
47	1911	San Hemp	0	4	0
48	1911	Poona Furnace	0	7	0
49	1911	An Examination of the Seed-Supply of the Ahmednagar District, Part I	0	5	0
50	1912	An Examination of the Seed-Supply of the Ahmednagar District, Part II	0	3	0
51	1912	Third Year's Experiments in the Treatment of Grape-Vine Mildew	0	3	0
52	1912	Muscovado Sugar Machinery and its scope for Gul Manufacture in India	0	8	0
53	1913	A Method of improving the Quality of Cotton Seed	0	7	0
55	1913	An Examination of the Seed-Supply of the Poona District ...	0	3	0
57	1913	Improvement of the Indigenous Plough of Western India ...	0	12	0
59	1914	Common Salt and its use as Manure in the Konkan Division ...	0	3	0
62	1914	The Value of Castration of Deccan Bullocks	0	3	0
63	1914	Substitutes for Rab	0	3	0
64	1914	Alkali or Kallar Experiments and Completion Report of Daulatpur Reclamation Station in Sind	0	14	0
65	1914	A List of Diseases of Economic Plants occurring in the Bombay Presidency	0	4	0
67	1914	An Examination of the Seed-Supply of the Sholapur District ...	0	3	0
69	1915	The Rice Stem Borer in the Konkan	0	3	6
70	1915	Improvement of Cotton in the Bombay Presidency (except Sind).	0	3	6
74	1915	Well Waters from the Trap Area of Western India	0	6	0

No.	Year.	Subject.	Price. Rs. a. p.
79	1916	The Cultivation of Guavas in Gujarat	0 5 6
80	1916	List of Seeds available on the Agricultural College Farm, Poona.	0 5 3
81	1916	Note on Fencing Construction	0 6 9
82	1916	Cultivation of drilled Paddy in South Bombay Presidency ...	0 3 0
83	1917	The Spice Gardens of Sirsi in Kanara	0 10 6
84	1917	Seed Selection Series—Kumpta Cotton	0 1 0
85	1917	Note on Cattle in the Bombay Presidency	0 11 0
86	1917	Establishment and Management of the Dairy Farm ...	0 7 0
87	1918	The Utilisation of Inferior Grass Herbage, Experiments at the Tegur Cattle Farm	0 9 0
88	1918	First Report on Fruit Culture as practised round about Tharushah (Sind) in Nawabshah District	0 2 0
89	1918	Artificial Manures: Experiments on their value for Crops in Western India	0 3 3
90	1918	Work on the Manjri Farms for the years 1915-18	0 7 3
91	1919	The Cultivation of Berseem in Sind—Experiments at Sukkur ...	0 1 0
92	1919	Classification and Description of the Jowars of the Bombay-Karnatak	0 10 3
93	1919	Palm Gul Manufacture in the Bombay Presidency (principally Date Palm)	1 3 9
94	1919	The Sugarcane Borer and its Control	0 4 3
96	1920	Investigations into the nature of the Salt Lands of Sind ...	0 12 0
97	1920	Prickly-Pear as a Cattle Food	1 4 0
98	1920	Fruit Culture as practised near Shikarpur, Sind	0 1 6
99	1920	Rice Cultivation in the Larkana District, Sind	0 3 0
100	1920	Fodder Crops of Western India	2 1 0
101	1920	Fruit Culture in Palitana and Jamnagar	0 3 6
102	1920	Investigations on Potato Cultivation in Western India ...	1 15 0
103	1920	The Book of the Mango	3 5 0
		Do. do. (Marathi).	
104	1920	The Ganeshkhind Botanical Garden, Kirkee (Its Genesis and Development)	0 15 6
105	1920	The Groundnut Bug and its Control	0 2 0
106	1920	Dharwar American Cotton: Its History, Cultivation and Improvement	0 7 0
107	1921	Gonag—a Weed in Drilled Paddy	0 5 0
108	1921	Summary of the work done on Jalgaon Farm	0 5 6
110	1922	Year Book of the Agricultural Department in the Southern Division	0 5 0
111	1923	A Note on Well Boring	0 3 0
113	1923	Year Book of the Agricultural Department in Sind Division ...	0 3 6
114	1923	Studies on the Rice Plant and on Rice Cultivation	0 13 0
115	1924	Shevri as a Fodder Crop	0 3 0
116	1924	Sugar Industry in Western India and Methods of Sugar Manufacture	1 2 0
117	1924	Investigations in Fig Culture and Treatment	0 5 6
118	1924	Land Crabs as Agricultural Pests in Western India	0 3 0
119	1924	Year Book of the Agricultural Department in Southern Division, 1924	0 4 6
120	1924	Silage for Fodder in Western India	0 4 0

No.	Year.	Subject.	Price. Rs.	a.	p.
121	1924	Further Investigation on Potato	0	6	0
72	(Revised 1925)	Experiments with the Automatic Water Finder in the Trap Region of Western India	0	4	0
122	1925	Sugarcane Varieties of Bombay Presidency, India	0	2	6
123	1925	Ridge Cultivation in Lower Gujarat	0	8	0
124	1925	The Chemical Composition of Food-grain Vegetables and Fruits of Western India	0	3	6
125	1925	Some of the promising exotic Sugarcane varieties of the Manjri Farm	0	13	0
126	1925	The Bhagnari Breed of Cattle in Sind and Baluchistan ...	0	6	0
127	1926	Elephant Grass—a new and useful Fodder Crop in Western India	0	1	0
128	1926	Cotton Cultivation in Sind	0	3	0
129	1926	The treatment of patches of Inferior Tobacco in Northern Gujarat	0	1	6
130	1926	Some useful forest Trees and Shrubs of the Coastal Tract and their fodder value	0	8	0
131	1926	The Fig Industry of Asia Minor	0	4	6
132	1926	The Improvement of Tobacco in Northern Gujarat	0	4	0
133	1926	Work of the Ganeshkhind Botanical Gardens and Modibag Garden in 1921-25	0	2	0
134	1927	Murrah Buffaloes in Sind	0	2	6
135	1927	An improved method of growing Turmeric in the Deccan ...	0	4	0
136	1927	Cattle Breeding in the Bombay Presidency, Principles and Progress	0	5	6
137	1927	Notes on the Lemon Industry in Italy	0	2	0
138	1927	Injurious Field Rats of Lower Sind and their Extermination ...	0	7	6
139	1927	Sugarcane Mills and small power Crushers in the Bombay Presidency	0	6	6
140	1927	Tobacco Cultivation in the Southern Maratha Country ...	0	3	0
141	1927	Trees and Shrubs for producing Green Manure in the Konkan and North Kanara	0	3	0
142	1927	Dry Farming Methods in the Deccan	0	6	9
143	1927	Experiments on Cotton Manuring in Khandesh	0	1	3
144	1927	Furnaces for making Gul or Crude Sugar in the Bombay Presidency	0	7	3
96	(Revised 1927)	The Cultivation of Oranges and allied Fruits in the Bombay Presidency	0	3	0
145	1927	Origin, Plan and Progress of the Sakrand Agricultural Research Station, Sind	0	4	3
146	1927	Crops of the Bombay Presidency: their Geography and Statistics, Part II	1	11	0
147	1927	Organisation and Cost of Gul-making in the Deccan Sugarcane tracts	0	2	6
148	1927	Culture of Guava and its Improvement by selection in Western India	0	7	3
150	1927	Crops of Sind: their Geography and Statistics	2	1	0
151	1928	Selections in the Jowars of the Bombay Presidency	0	6	0
152	1928	Water-finder Work in the Bombay Presidency	0	8	0
153	1928	Economic Value of Fruit Farming in Western India	0	6	0
154	1928	Assimilation of Nutrients by the Rice Plant (Technical series)	0	5	0

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No.	Year.	*Subject.*	Price. Rs.	a.	p.
155	1928	Die-back disease of Citrus trees and its relation to the soils of Western India	0	5	0
30	(Revised 1928)	Field, Garden and Orchard Crops of the Bombay Presidency	0	7	0
156	1928	Grape Culture in Western India			
157	1929	Study of the Soils associated with the deterioration of the Cardamom Crop in North Kanara	0	3	0
158	1929	Preliminary Note on the possibilities of the development of Lemon Industry in Western India	0	2	0
159	1929	Agriculture in Sind under the Barrage Canals system ...	0	6	0
160	1929	Soils of the Bombay Presidency	0	7	0
161	1930	Cattle Feeds of Western India	0	1	0
162	1930	Popaya Cultivation in the Bombay Presidency	0	3	0
163	1930	Powdery Mildew of the Grape and its Control in Bombay ...	0	3	0
164	1930	Study in Intensive Farming near Poona under Canal Irrigation .	0	4	0
165	1930	The Frost of January 1929 and its damage to Crops of the Bombay Presidency	0	6	0
166	1931	Bansi Wheat of the Bombay, Deccan and its Improvement ...	0	2	0
167	1931	Improvement of Manat lands in the North Konkan	0	2	0
168	1932	Preliminary Studies of important Crops in the Bombay Deccan in the postwar period			
169	1932	Cumin powdery Mildew in Bombay			
170	1932	Report on the Export of Mango to Europe in 1932			
171	1932	Grassland Problems in Western India			

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